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Bulletin No. 22 (Sixth Revision) *January,* 1946

Swine Production in Alberta

BY

DEPARTMENT OF ANIMAL SCIENCE

FACULTY OF AGRICULTURE
UNIVERSITY OF ALBERTA
Edmonton, Alberta, Canada

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DEPARTMENT OF ANIMAL SCIENCE

Distributed by
Department of Extension, University of Alberta
Edmonton, Alberta, Canada

COMMITTEE ON AGRICULTURAL EXTENSION AND PUBLICATIONS

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CONTENTS

	Page
Introduction	7
The Economics of the Swine Business	9
Our Market Outlet	16
The Type of Pig to be Raised	18
The Bacon Type Breeds	22
Swine Improvement Policies	26
Composition of Swine Feeds	30
Swine Feeds in Alberta	32
Mixed Supplements	39
Pasture Crops for Swine	42
Preparation of Feeds	46
Methods of Feeding	47
Care of the Boar	48
Care of the Brood Sows	50
Feeding the Sow and Litter	54
Feeding and Management after Weaning	58
Summer Management	61
Finishing Feeder Pigs	62
Winter Pig Production	64
Curing Pork on the Farm	69
Swine Raising Equipment:	
Danish Permanent Type Piggeries	73
Gable Type Colony House	80
Pig Brooder House	82
Self-feeder for Grain	83
Self-feeder for Minerals	86
Hog Shipping Crate	87
Hog Breeding Crate	88
Oat Hull Sifter	91
Hog Weighing Equipment	91
Swine Diseases	92

BEAR IN MIND

1. **Pigs will produce more meat from 100 pounds of feed than any other farm animal.**

2. **The pig will eat and grow and finish on a greater variety of feed than any other animal on the farm.**

3. **Pigs multiply rapidly so that the money invested in a sow is returned quickly.**

4. **Pigs constitute a reliable source of revenue and provide the farm table with a high class meat product.**

5. **Approximately 11,000,000 hogs were marketed in Alberta during the five years 1940 to 1944; this Province is an important contributor to Canada's export bacon supply.**

6. **Success in pig raising depends upon the use of good breeding stock of the proper type, together with good feeding and management methods.**

7. **One of the main problems in swine raising in Alberta arises out of the scarcity of skim-milk. A proper substitute should be used when milk is lacking.**

8. **Alberta grown grain—oats, barley and wheat—when properly supplemented will produce as good bacon hogs as can be produced anywhere in the world.**

9. **Pigs should be kept year in and year out. Over a period of years they will provide a profitable outlet for farm grown grains and farm by-products.**

10. **Control of diseases and parasites is essential to success in pig raising. Diseased pigs or those infested with worms are a liability rather than an asset.**

PREFACE

Since the swine herd was established at the University of Alberta in 1917, some 12,500 pigs have been farrowed. These pigs have been utilized in a variety of ways. A certain percentage have been shipped throughout the Province to assist in improving the quality of commercial pigs; a considerable number have served as material for student judging classes, but the majority have been used in the carrying out of experimental work.

During the past 28 years more than 120 swine feeding experiments have been conducted. Information has been gathered on a fairly wide variety of swine feeding problems. The object in conducting these experiments has been to gather information which would be of value to the swine raisers of Alberta and to assist in establishing principles which would have an application in swine-raising in any country.

The material which is presented in this bulletin, which now goes into the sixth edition, is based in the main on the results of our own experiments. Sections dealing with curing pork on the farm, swine diseases, and swine raising equipment have also been included. It is hoped that the bulletin will prove helpful to swine raisers and that it will assist in the direction of better and more profitable hog production in Alberta.

Swine Production in Alberta

BY

R. D. SINCLAIR

Professor of Animal Husbandry

Since the earliest homesteading days pig raising has constituted a worth-while phase of Alberta's agriculture. Those whose occupation of Alberta's lands preceded the development of established markets found the pig a good source of food supply, and a means of converting unmarketable grains into a commodity that had a cash value. We find the pig playing much the same role after approximately sixty years of agricultural evolution in this Province, only in the interval annual revenue from pig sales has risen from a few thousand dollars to many millions and pork products processed in Alberta packing plants find their way to the markets of the world. It may be recorded that during 1944, when Alberta marketed approximately 3,000,000 head of hogs she attained the distinction of being the unit in the British Empire which contributed the largest volume of bacon to the people of Great Britain in a time of great need. Alberta requires approximately 350,000 hogs for her own use. In 1944, 2,650,000 head were available for export. If it is assumed that this surplus was exported in the form of Wiltshire sides, sufficient bacon was made available to supply 24,000,000 people for a period of one year with a British war-time ration of four ounces per week.

In addition to supplying a high-class meat product the pig is second-to-none as a convertor of high grade as well as low grade grains into a concentrated, relatively low freight rate commodity. In times of high grain prices the value of the pig in the farm economy is not usually appreciated but when prices decline, when quotas limit the amount of grain which can be marketed, or when grades are lowered as a result of frost or other damage the value of this class of livestock is brought markedly to the fore. As will be indicated in the discussion which follows, the Alberta farmer who has kept pigs year in and year out, either as a very minor side line or as a major part of his farm enterprise, has little reason to be discouraged with the results in terms of financial returns.

During the six years, from 1939 to 1944 inclusive, approximately 12,000,000 hogs were delivered to stock yards and packing plants in Alberta, and the value of these hogs

amounted to approximately $262,000,000. According to figures supplied by the Dominion Markets Service, the value of all hogs sold in Alberta in the year 1944 alone was in excess of $75,000,000. The average annual revenue from hogs sold at stock yards and packing plants during the past six years was approximately $44,000,000, a sum which is significant in connection with farm buying power.

It is of interest to note Alberta's position in relation to the other provinces in Canada in the matter of swine population. According to the most recent statistics available, the various provinces rank as follows from the standpoint of swine population:

TABLE I.—ESTIMATED NUMBER AND VALUE OF SWINE IN CANADA, 1943

Province	Number	Value
Alberta	2,338,000	$37,408,000
Ontario	1,886,000	31,100,140
Saskatchewan	1,754,000	28,064,000
Quebec	979,000	17,622,000
Manitoba	877,000	15,066,860
New Brunswick	94,000	2,016,900
British Columbia	90,000	1,440,000
Nova Scotia	65,000	1,209,650
Prince Edward Island	65,000	1,040,000

It will be observed that in 1943 Alberta stood first among the provinces in Canada in the matter of swine population and it may be suggested that her position is likely to be strengthened in the years that lie ahead. Conditions are favorable for swine raising in the Province from the standpoint of volume, quality and continuity of feed supply, and this type of agricultural production is becoming firmly established, particularly in the mixed farming area. It is important that swine raisers realize Alberta's status in this field because it is clear that they have an important responsibility as contributors to Canadian pork supply for home or export consumption. The volume of live hogs originating in this Province must materially affect the quality of Canadian pork products and it, therefore, behooves Alberta producers to pay careful attention to improvement in quality.

Some idea of the trend of the swine industry in Canada and in Alberta over a period of years may be gathered from a review of the total number of swine marketed at stock yards and packing plants from 1923 to 1944. In order that improvement in quality may be studied in relation to increase in volume, the percentage of "selects" or "A" grade carcasses is submitted, along with volume of marketings, in Table II, which follows:

TABLE II.—TOTAL SWINE MARKETED IN CANADA AND IN ALBERTA AND PERCENTAGE IN TOP GRADE

(Selects, 1923-1940; "A" Grade, 1941-1944)

	Marketings		Percent. "Selects"	
	Canada	Alberta	Canada	Alberta
1923	2,362,146	406,380	15.28	2.43
1924	3,081,382	624,058	14.60	2.83
1925	2,785,241	620,036	15.42	3.55
1926	2,653,420	604,127	15.73	5.38
1927	2,815,093	544,321	17.06	6.09
1928	2,758,439	586,070	17.15	6.56
1929	2,659,009	681,544	16.52	5.54
1930	2,301,349	628,935	15.52	6.05
1931	2,643,372	723,352	15.14	7.13
1932	3,198,183	1,008,452	15.11	8.43
1933	3,205,425	1,032,169	16.28	7.94
1934	3,028,738	1,012,827	19.10	12.23
1935	2,957,621	953,752	22.96	18.56
1936	3,796,952	1,039,466	24.44	22.62
1937	3,986,397	980,272	24.44	24.93
1938	3,245,535	782,838	29.58	32.51
1939	3,706,179	979,898	29.88	36.00
1940	5,449,626	1,485,372	27.93	32.84
1941	6,216,207	1,947,053	31.53	30.47
1942	6,228,163	2,182,342	29.92	25.81
1943	7,149,421	2,392,384	27.94	23.88
1944	8,863,178	2,981,940	28.27	24.30

A glance at Table II will show that over a period of twenty years there has been a substantial increase in volume of swine marketings in Alberta. The peak reached in 1944 was due, of course, to the demand for bacon to fill contracts with Great Britain and to the comparatively favorable relationship between hog and grain prices which existed during the preceding year. The decline in marketings during 1945 indicates that swine production in Canada and in Alberta has not been stabilized at the 1944 level. The turn of events in the direction of less restricted marketing of grains and "equalization" payments on coarse grains has led to a sharp reduction in the pig population and final figures for 1945 will undoubtedly show a marked decrease in swine marketings. This occurrence is in line with a general weakness in our swine production programme—a tendency to go into and out of the pig business on the basis of a short term view rather than developing a condition of stability based upon the probable outcome of this particular phase of the farm enterprise over a term of years.

Is Hog Raising in Alberta Profitable?

It will be appropriate, early in the discussion of swine production problems in Alberta, to consider whether or not the pig business in this Province is on a sound economic footing. Our interest in what will follow, and in fact our interest in pig raising generally, in terms of a long time programme, may hinge on that point. A review of what has taken place in the years which have passed will prove valu-

able in this connection and may point the way to what may be expected to happen in the years that lie ahead.

In considering the economic status of the hog business it seems necessary to attempt to relate the cost of production to the selling price over a period of years and thereby show the number of years when hogs have been good property and the number of years when they could be considered a liability.

We have chosen to consider the years 1918 to 1944 inclusive, a twenty-seven year period which includes the last year of the 1914-18 war, the post-war period, the years of depression and recovery, and four full years of the second world war. It would appear that this period covers a sufficient variety of conditions to yield a result which should prove a valuable guide in laying plans in connection with a swine raising enterprise.

Two main factors enter into the cost of producing hogs. In the first place, overhead cost must be considered and in the second place the feed cost is an important item. At the University of Alberta, in an attempt to arrive at the cost of production of 100 pounds live weight of hogs, we have estimated in as practical a manner as possible the overhead cost of producing pork. We have taken four sows as an average farm unit and have calculated on the basis of seven pigs raised per litter with all sows farrowing in the spring and two farrowing again in the fall, or, in other words, six litters of seven pigs or forty-two pigs marketed during the year. Charging interest at six per cent. on the money invested in breeding stock, buildings and equipment, and on the value of the land used for pasture, allowing for a ten per cent. depreciation on buildings and equipment, charging pasture on the basis of cost of seeding and providing for a $3.00 labor return per pig, as well as fair compensation for delivery of pigs to market, we estimated an overhead cost of hog production. This figure has varied from time to time depending upon depreciation in values of breeding stock and other items as well as the labor return. The range has been from a high of $3.25 per 100 pounds during what may be regarded as normal years to a low of $2.15 per 100 pounds during the period of the depression.

From the results of numerous experiments with pigs under various conditions, we conclude that a figure of 450 pounds of grain or its equivalent for 100 pounds gain in weight is one that will meet average conditions. While it is true that there are many farms, especially those where cows are being milked, where the feed required will be considerably below 450 lbs., it must be remembered that there are many farms where on account of lack of proper supplements,

the figure will run much higher, and on the whole the 450 pound figure will not be far wide of the mark. If the monthly average cash grain price of oats and barley, feeding half and half, is charged to the 450 pound figure, and the overhead figure is added to this, we arrive at the monthly average cost of producing hogs. When this figure is related to the average monthly price of the basic grade of hogs, we can study the cost of production in relation to selling price.

The chart which is shown in Fig. 1 sets out the average monthly cost of production from January, 1918, to December, 1944, together with the average monthly selling price of hogs on the Edmonton market. In connection with production costs, grain was charged at Edmonton cash grain prices for 3 C.W. oats and 3 C.W. or No. 1 feed barley. Hog prices are based on the "thick smooth" grade for the years 1922 to 1929, on the "bacon" grade from 1930 to 1940, and on carcass prices converted to live hog prices from 1941 to 1944. Premiums for "selects" or "grade A" carcasses have not been included.

A study of the chart will show:

(1) The average price of the basic grade of hogs on the Edmonton Stockyards over the twenty-seven year period from 1918 to 1944 was $10.23 per 100 lbs.

(2) The average monthly cost of production of 100 lbs. live weight of hogs over the same period was $7.79 per 100 pounds.

(3) During this twenty-seven year period pigs paid all overhead costs, including interest on breeding stock, buildings and equipment, took care of depreciation, paid a labor return and marketing charges, and provided for a margin of approximately $2.44 per 100 lbs. between cost of production and selling price.

(4) The average monthly Edmonton cash grain price of 3 C.W. barley was 50c per bushel, whereas this grain was marketed through hogs at 79c per bushel. The barley was increased in value 58 per cent. and the oats in similar proportion by marketing as pork instead of as grain.

(5) During seven years out of the twenty-seven the cost of hog production has exceeded the selling price during certain months of the year. With the exception of 1924, however, there was no year when this situation prevailed throughout the whole year. 1927, '28, '31, '32, '33 and '36, the other "loss" years, during certain months a profitable price level obtained.

(6) During the period from 1918 to 1934 "ups" and "downs" in hog prices followed one another in a fairly defin-

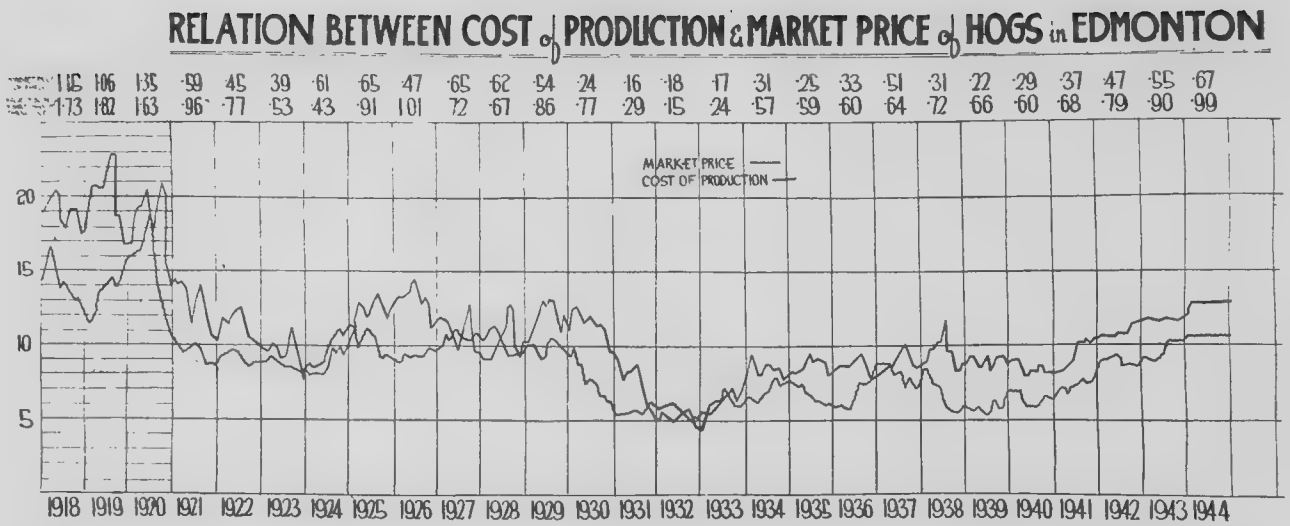


Fig 1.—Chart showing relation between cost of production and selling price of hogs—Edmonton 1918-1944. The solid line (upper) indicates "market price" and the wavy line (lower) represents "cost of production." The two lines of figures at the top of the chart show: upper—average yearly market price of barley at Edmonton; lower—average value of barley per bushel when marketed through hogs.

ite order. Following the introduction of the "quota" plan on the British Market in 1934 this trend was not so marked between 1934 and 1939. The operation of the Canada-United Kingdom bacon agreement, together with fixed prices for grain following 1939, introduced a period of comparatively stable hog prices with a fairly constant relationship between the cost of production and selling price.

On the basis of the findings of the study just outlined, it would appear that one may safely state that the swine business in Alberta has been on a sound economic footing. No business can be judged on one year's operations, and there are few enterprises that do not show occasional "loss" years. The Alberta farmer who makes pig raising a part of his regular farming programme over a period of years will find the business profitable rather than unprofitable. The individual who attempts to run pigs on the "in and out" plan is very apt to find the results disappointing as he is likely to be in when he should be out and out when he should be in. The "in and out" policy disturbs the marketing situation and gives rise to a condition of instability that is detrimental to the man who is a regular producer. The man who keeps pigs regularly, slightly raising or lowering the number of brood sows as changes in the market may be foreseen, is the one who contributes to permanency in the pig business, and is the one who has a class of stock on hand which can satisfactorily utilize grain of good quality or grain which may have depreciated in quality as a result of some adverse condition. In the latter regard our experiments of recent years have indicated that feed wheat can be satisfactorily utilized by pigs, and in 1929 with hogs selling around the ten-cent mark, feed wheat was marketed through the "hog route" at as high as $1.96 per bushel. In connection with the study just reviewed, it would be safe to state that the man who had dairy by-products available on the farm and has received a premium for the highest grade of market hog has had few "loss" experiences.

As a general rule the attitude toward pig raising is based upon the price at which grain can be marketed through hogs. The prices received for barley marketed through hogs as set out at the bottom of the chart shown in Fig. 1, represent the net return after deducting from the selling price of hogs the overhead cost of producing 100 pounds of live hog. The net return is a more representative figure than the gross price which is sometimes quoted. If hogs are selling at the equivalent of $10.00 per cwt. live weight and the overhead cost per cwt. is $3.25, the return on the grain required to produce 100 pounds of live hog is $6.75. If the requirement for grain or

its equivalent is 450 pounds, the return per pound of grain is 1½c. The net price received for wheat is 90 cents per bushel, barley 72 cents per bushel, and oats 51 cents per bushel.

When the feed requirement is lowered as a result of efficient feeding, the net price is increased, and on the other hand, when the amount of feed required is high, a lower price is returned.

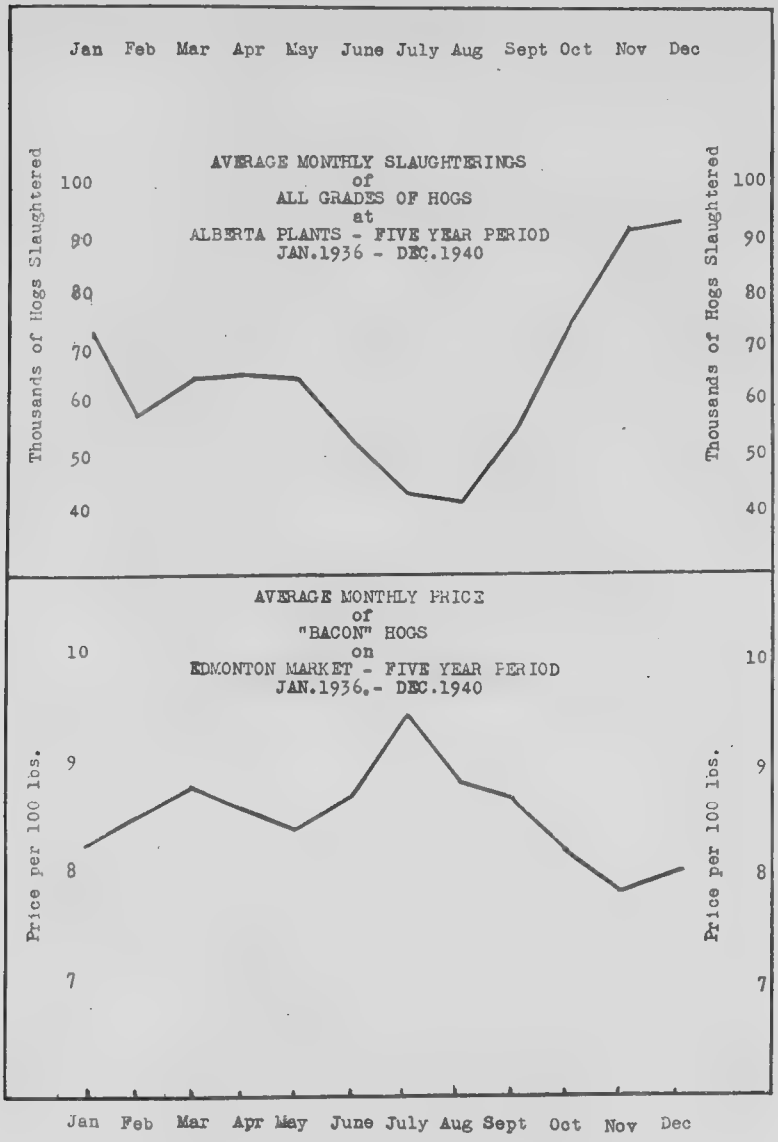
As a guide to the net returns which may be expected for grains when hogs sell at variable prices, and in order to indicate the influence on returns of the amount of feed required to produce 100 pounds of live weight gain, the following table is submitted:

TABLE III.—NET RETURNS FOR GRAIN WHEN MARKETED THROUGH HOGS

Net returns for grain allowing 400 lbs. of grain or its equivalent for 100 lbs. live weight gain:				
Market price of hogs—live wt.....	$10.00	$11.00	$12.00	$13.00
Market price of hogs—dressed weight..	13.35	14.70	16.00	17.35
Net value per bushel grain fed:				
Wheat	.92	1.07	1.22	1.37
Oats	.52	.60	.69	.78
Barley	.73	.85	.97	1.09
Net returns for grain allowing 450 lbs. of grain or its equivalent for 100 lbs. live weight gain:				
Net value per bushel grain fed:				
Wheat	.82	.95	1.08	1.22
Oats	.47	.54	.62	.69
Barley	.65	.76	.86	.97
Net returns for grain allowing 500 lbs. of grain or its equivalent for 100 lbs. live weight gain:				
Wheat	.74	.86	.98	1.10
Oats	.42	.49	.55	.62
Barley	.59	.68	.78	.89

Monthly Variations in Marketing

A situation which affects the business of processing hogs and presents a problem in connection with continuity of supply of pork products for export is the irregularity of volume of hogs being marketed from month to month. The tendency in this respect during pre-war years is indicated in the chart shown in Fig 2. As a general rule, a much larger number of hogs is marketed during the fall and early winter months than during the summer months. Regularity of supplies is very desirable, and anything that can be done in connection with arranging for farrowing fairly steadily throughout the year will contribute to an even flow of hogs to the packing plants. There has been considerable improvement in Alberta in this respect during recent years. Better farrowing quarters, treatment for anemia and inside feeding have all contributed to this betterment in our performance. One of the important factors in establishing Denmark so solidly in the British bacon market during the inter-war years was regular volume of shipments


Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
AVERAGE MONTHLY SLAUGHTERINGS
of
ALL GRADES OF HOGS
at
ALBERTA PLANTS - FIVE YEAR PERIOD
JAN.1936 - DEC.1940
Thousands of Hogs Slaughtered
100
90
80
70
60
50
40
AVERAGE MONTHLY PRICE
of
"BACON" HOGS
on
EDMONTON MARKET - FIVE YEAR PERIOD
JAN.1936.- DEC.1940
Price per 100 lbs.
10
9
8
7
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

resulting from an even week by week movement of hogs from Danish farms to bacon factories. We must continue in our efforts to still further improve our position in this respect. The only practical way to compensate for monthly fluctuations in slaughterings is to put bacon in cold storage and this will lead to a lowering of the net returns.

Our Market Outlet

A matter of great concern in connection with the production of any class of livestock is that of available markets for the product.

The Canadian market is, of course, our best outlet for pork and pork products, absorbing annually some 550,000,000 pounds or approximately 50 pounds per person. The Canadian population is, however, not large enough to absorb the annual pig crop of the country, and as a result we are in the position of being an exporting country. Since the quality of the pork which must be disposed of outside the country has an important bearing on the price paid for hogs in Canada, we are in the position of having to plan our pig raising programme along lines which will insure the marketing of a product of the very best quality.

While we, in Canada, are situated in close proximity to a great consuming nation, the United States, they, too, under normal conditions produce more pork than they require and may be regarded as an exporting rather than an importing country. A duty is placed upon live hogs and pork entering the United States from Canada. This means that we must look to some country which is a regular importer of pork products on a generous scale if we are to establish a steady market for Canadian hogs.

In this connection Great Britain stands as our most attractive market. Year in and year out Great Gritain imports vast quantities of meat to meet the needs of her population. In normal times Britain imports pork products from many different countries, the total annual import requirement of bacon being around 700,000,000 pounds. With exports from European countries cut off as a result of the 1939-45 war, Great Britain was dependent upon Canada for practically her total supply of bacon and other pork products. As a result of this condition new opportunities and greater responsibilities were presented to Canadian swine raisers. British consumers in larger numbers than ever before were provided with an opportunity to become acqainted with Canadian bacon. A strong case for the continuation of a substantial bacon quota on the British market has been established. It is essential that the volume of production be

maintained at a level which will enable us to take care of our present commitments with the British Ministry of Food and take advantage of whatever percentage of British bacon imports may be allotted to us under future trading arrangements.

The Canadian-United Kingdom Bacon Agreement

Since 1939 all negotiations regarding the export of Canadian bacon to Great Britain have been carried out between the British Ministry of Food and the Canadian Government. The first agreement to supply Great Britain with a definite volume of bacon at an agreed price came into effect in November, 1939. Contracts were renewed annually during the period of the war with modifications in volume and price from year to year. It was stipulated that bacon delivered by Canada under the agreements must be of quality equal to the pre-war standard and that 75 per cent. must be in the form of Wiltshire sides.

The following table will give some particulars regarding the various agreements covering the years from 1940 to 1945:

TABLE IV.—TERMS OF CANADA-UNITED KINGDOM BACON AGREEMENTS

	Quantity Bacon Specified (Mill. lbs.)	Quantity Bacon Exported (Mill. lbs.)	Price or Grade A Wiltshires at Seaboard ($ per 100 lbs.)
First Agreement (1940).....	291.0	331.0	18.01
Second Agreement (1941)	425.6	425.6	15.82
Third Agreement (1942).....	600.0	600.0	19.77
Fourth Agreement (1943).....	675.0	675.0	21.75
Fifth Agreement (1944-45).....	900.0		22.50

The Canadian Meat Board

In order to carry out the agreement between the British Ministry of Food and the Canadian Government, what was known originally as the Canadian Bacon Board, was organized and commenced functioning on December 22, 1939. Early in 1943 the responsibilities of the Canadian Bacon Board were enlarged and the name broadened to the Canadian Meat Board. The general functions of the Canadian Meat Board in relation to the bacon contracts may be summarized as follows:

(1) To ensure regular supplies of bacon as required.

(2) To arrange price differentials between grades of bacon so as to ensure pre-war quality.

(3) To regulate marketings to see that export requirements will be available.

(4) To store bacon in order to supplement supply in seasons when current marketings are inadequate.

(5) To see that hog prices bear a fair relationship to the agreed price for bacon.

(6) To pay storage charges.

The Meat Board purchases bacon from the individual processor of hogs in Canada for delivery to the British Ministry of Food, sets the grades and prices paid for the various grades of Wiltshire sides, inspects bacon at the seaboard and in general does everything possible to keep regular supplies of bacon moving forward for shipment to Britain and at the same time protect the interests of the producer. The Canadian Meat Board does not have any jurisdiction over the carcass grading of hogs.

The Type of Pig to be Raised

Keeping in mind the importance of the British market as an outlet for Canadian pork products, and the fact that under the terms of the Canadian-United Kingdom Bacon Agreement, 75 per cent. of the pork shipped to Britain under the terms of the contract must be in the form of Wiltshire sides, it is well to consider now what is meant by the term "Wiltshire side" and what type of pig we must produce to yield Wiltshire sides of the best quality.

A Wiltshire Side

The term "Wiltshire", unlike Yorkshire or Berkshire, does not refer to a breed of pig but to a particular style of dressing the hog carcass. A "Wiltshire side" is one-half of the carcass of a pig with head, feet, shoulder blade, leaf-lard, tenderloin, neck bone, back bone, tail bone and minor trimmings removed. An average 200 pound hog will yield approximately 150 pounds of warm carcass weight and 145 pounds of cold carcass weight. When the carcass is split and trimmed it will yield two Wiltshire sides of about 57 to 58 pounds in weight.

Britain's bacon trade in normal times centres very largely around the Wiltshire side and when this product is properly cured and smoked it constitutes an attractive article.

Wiltshire sides such as shown in Fig. 3, page 19, are packed, four to a bale, and since they only receive a comparatively mild cure in Canada, must be shipped to Britain with the least possible delay.

Requirements of a Choice Wiltshire

In order to receive the highest grading and bring the top price, Wiltshire sides must meet certain specifications, among them being the following:

(1) Uniform weights ranging from 55 to 65 pounds. Wiltshires within these weights are referred to as "sizable"

Fig. 3.—Wiltshire side. Note the length from hip bone to first rib and the uniform depth of back fat.

and sell for the highest prices. Those of heavier or lighter weights sell at a discount. Hogs marketed at from 190 to 210 pounds liveweight will yield "sizable" Wiltshires.

(2) Good length from the first rib to the hip bone, since this is the highest priced portion of the side.

(3) Shoulders light, as the shoulder cuts are lower priced.

(4) Ham trim, but well developed and carried with meat well down to the hock. The ham or "gammon" as it is called in the British trade, is a comparatively high priced cut.

(5) Evidences of a high percentage of lean meat as indicated by lack of any excess fat. An even covering of fat from 1¼ to 1½ inches along the back is most desirable.

(6) Belly thick, as indicated by fullness and firmness in the region of the flank.

Type of Pig to Produce High Class Wiltshires

It would seem quite clear that if we are to supply Great Britain with Wiltshire sides of superior quality and at the same time make available to Canadian consumers pork products carrying a high percentage of lean meat, our aim should be the production of pigs of the bacon type. Pigs of bacon type are recognized universally as the only kind which can be utilized satisfactorily in the production of lean pork, and in a country such as Denmark, which for many years dominated the British bacon market, pigs of this type were the only kind which farmers were permitted to raise.

Fig. 4.—A pig of select bacon type. Note the long side, deep flank, strong loin and full, trim ham. Pigs of this type are economical feeders and produce Wiltshire sides which meet the requirements of a discriminating market.

In general type, bacon hogs are slightly long of leg, a feature which gives them a style and alertness not found in pigs of the old lard, or butcher type. The bone must be strong and clean and the pig must stand up well on its pasterns. Length of side is a feature of prime importance, and this length is estimated from just behind the shoulder to the hip joint. The shoulder must be smooth, showing no tendency to bulge on the side; an even arch of back from neck to tail without heaviness at the neck or "crest" indicates uniformity of fleshing, and an evenness of width throughout the body suggests good development of back, loin and ham in relation to shoulder. The bacon hog should show fair depth of body in order to insure good feeding qualities. Constitution is indicated by width between the eyes, and between the forelegs, and lack of over refinement of bone. Freedom from excess fat at the jowl, underline, and ham facings insures a leanness of carcass and freedom from waste which is highly desirable. Bacon hogs of this type killed at weights of from 190 to 210 pounds produce Wiltshire sides of acceptable quality and weight. Hogs of this type are economical feeders, and are admirably adapted to make use of the kind of cereals which are raised on the farms of Alberta. Experimental evidence is at hand to show that pigs of correct bacon type grow as well and do not require any more feed than pigs of a thicker type.

Bacon Type Breeding Stock

If market hogs of the proper type are to be produced, the breeding stock must show the characteristics desired in the offspring to be sold. The type of pigs marketed will depend very largely on the class of sow kept and the type of boar to which she is mated. Whether pure-bred or grade, a sow should be selected out of a litter of good size and preferably from a sow of good disposition and possessing good milking qualities. Bacon type sows must show plenty of length of side and at the same time sufficient depth of body to insure good feeding and breeding capacity. Strength of constitution should not be sacrificed for length. Young bacon type sows should show good fleshing qualities of back, loin and ham, and must stand straight in the pasterns. Sows that are "bare on top" are apt to produce late finishing pigs. A good sow should possess twelve, or better still, fourteen teats, as mammary development will be a main limiting factor in the production of large litters. The sow should be feminine in appearance and free from any tendency toward coarseness and "stagginess".

A pure bred boar should always be used, and in selecting a boar the type of sows to which he is to be mated should be

Fig. 5.—A pure-bred boar should always be used. This Yorkshire boar in use at the University Farm shows good length with strength of constitution.

given careful consideration. If the sows show exceptional length and a tendency toward lack of constitution, a boar of moderate length but possessing a strong constitution should be used. Likewise, if the sows lack length, this feature should be a dominant characteristic of the boar selected. In the main, the bacon type boar should be masculine, should show a ruggedness of bone, without coarseness, good length with strength of constitution, together with strength of top and smoothness and evenness throughout. It should be borne in mind that boars of the proper type are a very important factor in improving the quality of commercial pigs, since a good breeding boar may be mated to a large number of sows, and for that reason great care should be taken in the selection of this member of the herd.

In selecting breeding stock care should be exercised to choose from litters which do not contain any individuals showing ruptures, ridglings or hermaphrodites. These conditions are hereditary and can only be eliminated within a herd by selecting from strains which are free of such defects.

The Bacon Type Breeds

While the matter of type is probably of greater importance than the breed in the selection of breeding stock, yet it is well to consider the merits of the various breeds so that an intelligent selection may be made. A good many breeds of American and European origin have made their appearance in Alberta, but it is generally recognized that the only breeds

which are likely to produce a high percentage of pigs of correct bacon type are the Yorkshires, Tamworths and Canadian-type Berkshire. While a certain number of pigs of the bacon type may be secured from such breeds as the Duroc-Jersey, Poland-China, Chester White and Hampshire, they too often lack the length and quality of finish necessary to yield high class Wiltshire sides. These breeds were developed under conditions where bacon producing feeds were not dominant and lean pork was not demanded, and it is not to their discredit that they do not fit well into the bacon scheme.

The Yorkshire

The Yorkshire breed is generally recognized as the premier bacon breed, and is extensively used in all countries where the aim is bacon production. In such countries as the Irish Free State, Denmark, Holland and England (where the breed originated), the majority of the pigs being slaughtered show the influence of Yorkshire blood. In Eastern Canada the Yorkshire has long been a popular breed, but only since the Dominion Government's hog grading policy was introduced in 1922 has the Yorkshire been extensively used in Alberta. Since the general introduction of Yorkshire breeding stock following that date, a marked improvement in the quality of the pigs being marketed has been noted. In all of the provinces of Canada the Yorkshire far outnumbers all other breeds combined.

The Yorkshire is a pure white breed, black hair and skin spots being objectionable. The breed is noted for its size, mature boars weighing from 700 to 800 pounds and mature sows from 600 to 700 pounds. Length of body is a prominent characteristic of the breed. Yorkshire sows are generally

Fig 6.—Champion Yorkshire sow, English Royal Show, 1932.

very prolific, and as a rule have the necessary mammary development to nurse large litters. Certain strains of Yorkshires tend to lack somewhat in constitution and feeding qualities, and a susceptibility to sunscald under certain conditions has made the breed unpopular on some Alberta farms. When Yorkshires possessing not only length of body, but strength of constitution as well are selected, and simple though definite precautions are taken to prevent sunscalding, there appears to be no doubt that this breed provides the surest means of attaining the production of a high percentage of select bacon hogs.

The Tamworth

The Tamworth is one of the oldest breeds of pigs, and has been noted from the beginning as a producer of good quality bacon. A golden red is the typical color; black skin and hair spots should be eliminated. As a breed, the Tamworth is scarcely as large as the Yorkshire, although boars will weigh from 600 to 700 pounds and sows from 500 to 600 pounds when mature.

Tamworth pigs show a good depth of side, but as compared with the Yorkshires lack somewhat in length of side and tend to be light in the hindquarters. On the whole, however, the Tamworth seems to possess good fleshing of back and loin, and it is rare for pigs of this breed to lack the necessary finish at weights from 200 to 210 pounds.

Tamworth sows, as a rule, are not as prolific as Yorkshires, and young sows especially are inclined to give rather

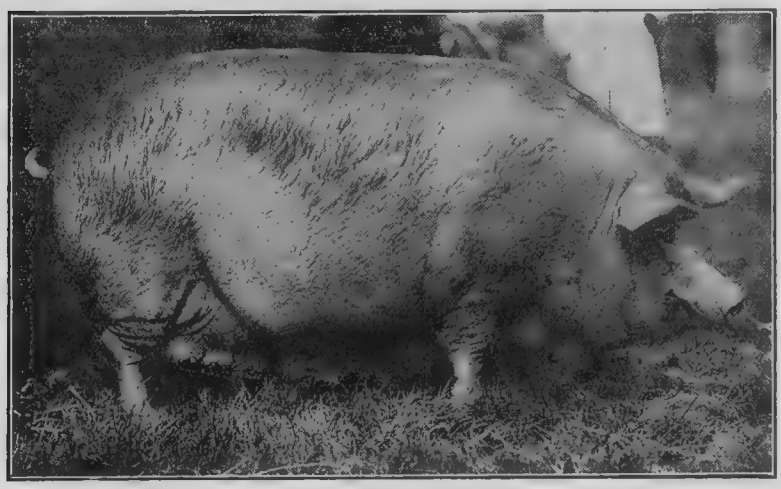


Fig 7.—Champion Tamworth sow, English Royal Show, 1932.

small litters. Improvement in prolificacy is a requirement of the breed at the present time. The following table shows the relative size of litters of the three breeds under discussion. The figures presented are compiled from our farrowing records at the University of Alberta for the years 1922 to 1940 inclusive:

TABLE V.—AVERAGE SIZE OF LITTERS OF VARIOUS BREEDS

	No. of Farrowings.	Total Pigs Farrowed.	Av. Size of Litter.
Yorkshire	482	5,285	11.0
Tamworth	518	4,669	9.0
Berkshire	169	1,404	8.3

The swine raiser who is aiming to produce hogs of the bacon type and who objects to the white color may well select the Tamworth as a breed with many splendid qualities. In selecting pigs of this breed, length as well as development of hindquarters should be kept in mind.

The Berkshire

The Berkshire has never been recognized as a bacon breed, but what is known as the Canadian type Berkshire has been developed along bacon lines. Certain breeders have developed a type which shows sufficient length to yield carcasses of passable type, but the black color is a limiting factor in the use of this breed for purposes of bacon production in view of the objectionable skin color and the tendency toward the production of "seedy" bacon. Berkshire sows may be crossed with Yorkshire boars, producing white pigs of bacon type.

Fig. 8.—Grand Champion Berkshire sow, at Royal Winter Fair, Toronto, 1929. Owned by P. J. McEwen, Wyoming, Ont.

Swine Improvement Policies

In an endeavour to standardize the type of hogs reaching Canadian markets and to encourage the general production of pigs conforming to the bacon type, certain Federal and Provincial Government Swine policies have been put into effect. Such policies are common to all countries concerned with catering to an exacting export market, and it should be borne in mind by Alberta swine producers that practically all European countries exercise very rigid government control over the swine industry. Such control is considered absolutely necessary if a standardized, high-grade article is to be secured. The view is held that any breed, breeding method, or feeding method which is detrimental to the general uniformity of the export product, must be eliminated for the common good.

Carcass Grading of Hogs

Chief among the policies having as their object the improving of the quality and standardizing the weights of Canadian Wiltshire sides, may be mentioned the Dominion Government plan of carcass grading of hogs.

The general plan of hog grading which was put into effect in 1922 had as its object the grading by official Government graders of all hogs offered at Canadian Stock Yards and Packing Plants, and the payment of a premium for pigs of the type, weight and quality suitable in the production of the highest grade of export bacon.

All hogs were graded alive until 1934, at which time an alternative plan of selling hogs on a basis of carcass grade was made available to producers. From 1934 to September 1st, 1940, the swine raiser had the option of selling his hogs according to "live" or "carcass" grade. During this period the percentage of hogs graded in the carcass increased annually as producers became acquainted with carcass grading procedure and the advantages which the system offered to the producer of hogs of top quality. According to official figures, during the first nine months of 1940, approximately 65 percent. of the hogs marketed in Canada were carcass graded under the optional system.

Commencing with October 1st, 1940, carcass grading of hogs became the official system and live grading was discontinued.

Full particulars regarding the application of rail grading may be obtained from the Livestock and Livestock Products Division, Marketing Service, Department of Agriculture, Ottawa, or through the Supervising Grader at the Calgary and Edmonton Stockyards.

For the convenience of readers of this bulletin, the official hog carcass grades in effect at the time of publication are set out as follows:

STANDARD FOR GRADES OF HOG CARCASSES

(a) Weight Ranges and Carcass Measurements

GRADE "A":			Class 1
Weight			140-170 lb.
Minimum length			29"
Maximum shoulder fat			2"
Maximum loin fat			1½"
GRADE "B":	Class 1	Class 2	Class 3
Weight	135-175 lb.	125-134 lb.	176-185 lb
Min. length according to weight	28"-29"	27"	30"
Max. shoulder fat according to wt.	2"-2¾"	2"	2¾"
Max. loin fat according to wt.	1½"-2"	1½"	2¼"
GRADE "C":			Class 1
Weight			120-185 lb.
Max. shoulder fat according to wt.			2¼"-3¼"
Max. loin fat according to wt.			1¾"-2½"
GRADE "D":			Class
Weight			120-185 lb.

and underfinished rough, soft or oily carcasses of any weight.

LIGHTS—Weight 119 lb. and under.
HEAVIES—Weight 186 lb. to 195 lb.
EXTRA HEAVIES—Weight 196 lb. and over.
PHYSICAL INJURY—All weights.
RIDGLINGS—All weights.
STAGS—All weights.
SOWS, Class 1—All weights.
SOWS, Class 2—All weights.

(b) Grade Standards

GRADE "A":
All carcasses shall be of best quality.
Shoulder—Shall be balanced in weight in relation to the ham.
Belly—Thick and of even width throughout, with full flank.
Ham—Full fleshed, evenly covered with fat of good shape.
Back—Fat firm and of even thickness within variation allowed.
Quality—Fat firm and white with proper balance of fleshing and fat in carcass throughout. Skin shall be smooth and show no marked evidence of dark hair roots or pigment.

GRADE "B":
Grade "B" may vary from Grade "A" in any weight class as follows:
Classes 1 and 3—
Shoulder—Slightly heavy or slightly fat.
Belly—Slightly thin or fat or wide.
Ham—A little thin or slightly fat.
Back—Fat slightly uneven on back or slightly deficient or a little overfat throughout the carcass.
Quality—Fat a little soft or somewhat out of balance between lean or fat.
Class 2—
Shoulder—Slightly heavy.
Belly—Thin or uneven.
Ham—A little thin.
Back—Fat slightly uneven on back or slightly deficient.
Quality—Fat a little soft.

GRADE "C":
Shall be well finished and of good quality of fleshing, but may vary from Grade "B" by including a greater degree of fat to lean, softness and unevenness of fat, heaviness of shoulder and roundness of rib.

GRADE "D":
May contain overfat, unfinished, rough, soft or oily carcasses.

LIGHTS:
This grade shall include all carcasses of reasonable finish and quality within the prescribed weights, but shall not include thin or under-finished carcasses.

HEAVIES:
This grade shall include all carcasses of reasonable finish and quality within the prescribed weights, but shall not include thin or underfinished carcasses.

EXTRA HEAVIES:
This grade shall include all carcasses of reasonable finish and quality within the prescribed weights, but shall not include thin or underfinished carcasses.
PHYSICAL INJURY:
Carcasses that have suffered physical damage.
RIDGLINGS:
Carcasses from ridgling pigs.
STAGS:
Carcasses from boars which have been castrated and healed.
SOWS:
All females that have raised one or more litters.
Class 1—Carcasses of good fleshing throughout.
Class 2—Carcasses that are overly fat or very thin.

The price paid for hog carcasses varies according to grade. Payment according to grade offers some reward to the producer who markets a top quality product and tends to discourage the production of hogs which yield carcasses unsuitable for the best bacon trade.

The original agreement when live hog grading was started in 1922 called for the payment of a 10% premium on "selects" over "thick smooths". This arrangement continued until 1929 when the live grades were modified. At this stage the basis for paying the premium was revised to a straight increase of 50c per hundredweight for "selects" over pigs of the second grade (bacon). When carcass grading commenced in 1940 the premium was set at $1.00 per carcass for "A" grade as compared with the basic price for "B" grade carcasses. The lower grades were subject to standard price discounts.

Commencing with January, 1944, a further revision in the system of paying premiums and levying discounts was put into effect. The $1.00 premium paid by packers for Grade A carcasses became a part of the price paid for carcasses of that grade. The spread in price between grades was to be based on the carcass grade value for export bacon. These prices are subject to the approval of the Canadian Meat Board.

The Dominion Government then commenced the payment of premiums of $3.00 for "A" grade and $2.00 for "$B_1$" grade carcasses.

Advanced Registry for Swine

A Dominion Government Policy which is making an important contribution to swine improvement is known as the Advanced Registry Policy for Swine. This scheme seeks to identify the best producing sows and boars in pure-bred herds and puts a premium on litter size, early maturity and carcass quality. The breeder owning sows and boars qualifying under this scheme is in a position to supply superior breeding stock to commercial producers, and incidentally is

entitled to a premium for stock from proven ancestry. A Pig Testing Station to facilitate the carrying out of this Policy is in operation near the City of Edmonton. Information regarding this scheme may be secured from the District Fieldman, Livestock Production Services, Dominion Department of Agriculture, Edmonton.

Other Federal Swine Policies

In addition to the policies discussed, the Dominion Government has in operation a number of other swine improvement policies. These include brood sow distribution, gilt culling, sire purchase and the loaning of boars to Junior Swine Clubs and Swine Improvement Associations. Farmers interested in taking advantage of any of these forms of assistance are advised to communicate with the District Fieldman, Livestock Production Services, Dominion Department of Agriculture, Edmonton.

Provincial Swine Policies

The Alberta Department of Agriculture, through the Live Stock Branch, offers the Swine Improvement Policy for the placement of pure bred sires. It is designed to assist in supplying approved sires in particular to commercial swine producers in the province. Under this Policy transportation charges are paid on Government-purchased pure bred bacon type boars to the nearest shipping point of the applicant.

Applicants for sows and those who are not eligible for boars under the Swine Improvement Policy may obtain breeding stock through the Live Stock Listing Bureau. This plan does not provide for free transportation.

The Dominion-Provincial Sow Distribution Policy provides for selection and placement at cost, of good bacon type sows to organized breeding groups comprising at least five members and requiring not less than twenty sows. The Dominion Government supplies a boar free of charge. Transportation charges are shared equally by the Dominion and the Provincial Governments.

General assistance on the subject of breeding, feeding and management of swine is provided to all swine growers and breeders by the Live Stock Branch, Department of Agriculture, Edmonton, and by District Agriculturists representing the Department at various points throughout the province.

Swine Clubs

Among the agencies which have been responsible for marked improvement in the quality of Alberta hogs of recent years are the Boys' and Girls' Swine Clubs. These

clubs, which are supported by both Dominion and Provincial Governments, not only interest the young people in raising good pigs, but are centres of swine improvement which work into extensive areas. Communities interested in organizing a swine club may secure information regarding this movement from the Supervisor of Boys' and Girls' Clubs, Department of Agriculture, Edmonton, or from their nearest District Agriculturist.

Scale of Operations

As a general rule the pig business is subsidiary to some other branch or branches of the farm enterprise, and it would seem that the greatest returns are to be secured from pigs when they occupy this position. When only a few sows are kept a considerable portion of the feed supply is in the nature of "odds and ends" about the farm, and the grain allowance is supplemented by a certain amount of dairy by-products or household refuse. Under such conditions the feed bill to be charged to the pigs is not heavy and good returns can readily be calculated. It is a mistake to estimate that twenty sows will give twenty times the returns that one sow will, for when the numbers are multiplied the drain on the grain supply is heavier, and in order to compensate for the scarcity of milk and household garbage, some supplementary feeds must be purchased. At the same time, as has been pointed out previously, even when the higher grades of grain are fed, and supplementary feeds are utilized, fairly large scale pig raising can be profitably carried on over a period of years. The inexperienced pig raiser will, however, be well advised to carry on in a small way until he has a chance to study the efficiency of his methods in the light of the returns which he is securing.

FEEDING AND MANAGEMENT OF SWINE

In connection with swine raising, considerable progress has been made when the correct type of breeding stock has been secured, but the ideal in market hog production will not be attained unless the best feeding and management methods are followed. Unless the breeding stock is maintained in vigorous condition and the young pigs are kept growing from the start on well balanced feeds, the "pork making machinery" is not likely to function efficiently. The aim in the pig business should be the marketing each year of a maximum number of pigs on a minimum amount of feed, or, in other words, economical production.

During the past twenty-six years a considerable number of swine feeding experiments have been conducted at the University of Alberta. The main objects of these experi-

ments have been to study rations, supplementary feeding, and methods of feeding with a view to determining the feed combinations and methods of feeding which will produce an acceptable type of pig at the lowest possible feed cost, and during a feeding period of minimum length. It will be the object of the discussion which follows to present to swine raisers a review of swine feeding and management problems based on the results of experiments conducted at the University of Alberta, with the hope that it may be of some service, particularly to those who may have had comparatively little previous experience with hogs.

Composition of Common Swine Feeds

Before commencing a discussion of feeding and management practices, however, it should be of interest to consider some facts relative to the composition of common swine feeds and to draw some general comparisons between the various feeds available to Alberta swine producers..

A very good idea of the comparative value of various feeds may be secured by subjecting them to a chemical analysis. The chemist groups the various components of feeds under the following headings: water, ash, crude protein, fibre, carbohydrates and fat. The constituents of oats, for example, are grouped in this way because each of these groups plays a definite and different part in connection with body up-keep and growth.

The moisture content is determined because the less moisture a feed contains the higher its feeding value, pound for pound. Cereals which are damp or tough do not return as good value for each 100 pounds fed as those of lower moisture content.

The ash contains the mineral constituents of the feed, and unless additional mineral matter is fed, the ash forms the only source of supply of mineral for the animal. The ordinary farm-grown grains are very low in ash. The hays and grasses contain more ash; such hays as alfalfa and the clovers are very rich in mineral matter, especially lime. Since pigs are fed heavily on cereals, it is necessary to pay careful attention to mineral supplements.

The crude protein contains all the nitrogenous compounds, and this part of the feed is used to produce lean meat, body tissue, hair, skin, hoof, etc. The demand for protein is very heavy in young growing pigs, pregnant sows and sows nursing litters. The bacon hog, which is a producer of lean meat, requires a plentiful supply of protein rich feeds. Such feeds as skim-milk, tankage, linseed oil meal, fish meal and bran are rich in protein.

The fibre is the part of the feed stuff which is of least use to the pig. Oat hulls consist largely of fibre and are to a large extent indigestible. Cattle and sheep can make considerable use of fibrous feeds because they have a large paunch and chew the cud, but the pig with its small stomach, can make little use of high fibre feeds. This is a point to be borne in mind in pig feeding.

The carbohydrates compose the starchy portion of the feed, and are largely used to supply the heat and energy required by the pig and for the production of fat in the body. Barley, wheat and corn are feeds which are rich in carbohydrates.

The term fat, when used in connection with the composition of a feed, embraces not only true fat but certain fat-like substances. The fat is used for the same purposes as the carbohydrates, namely, heat and energy and the production of body fat. If a feed is very rich in oils, especially those of a soft nature, they may adversely influence the quality of fat in the carcass. None of the feeds commonly used in Alberta, however, are likely to cause any trouble in this respect.

A table setting out the percentage composition of various feeds may constitute a valuable guide in arriving at relative values, and for that reason the following table is submitted. A large number of chemical analyses have been made of the common feeds and a reliable average figure has been obtained. Figures relating to the content of ash, fibre, protein, carbohydrates and fats can be studied with profit.

*PERCENTAGE COMPOSITION OF SOME COMMON SWINE FEEDS

	Water.	Ash.	Total Protein.	Fibre.	Carbo-hydrates.	Fat.
Oats	8.9	3.6	12.0	10.6	60.2	4.7
Barley	9.6	2.9	11.8	5.7	68.0	2.0
Wheat	10.2	2.0	13.1	3.0	70.0	1.7
Corn, Dent	11.5	1.4	9.7	2.3	71.1	4.0
Rye	10.0	2.0	12.3	2.3	71.7	1.7
Shorts	10.3	2.5	16.1	2.9	65.1	3.1
Bran	9.4	6.0	15.8	9.5	54.3	5.0
Skim-milk	90.4	0.8	3.7	...	5.0	...
Butter-milk	90.6	0.8	3.5	...	4.5	...
Tankage	7.8	25.9	50.3	2.0	2.7	11.3
Linseed oil meal	9.7	5.4	35.3	8.0	36.2	6.4
Fish meal	7.5	14.7	66.7	0.7	3.6	6.8
Alfalfa hay	9.6	8.3	14.7	29.0	36.4	2.0
Potatoes	78.8	1.1	2.2	0.4	17.4	0.1
Rape pasture	83.6	2.2	2.9	2.6	8.1	0.6

*From "Feeds and Feeding," Morrison, twentieth edition.

Swine Feeds Available in Alberta

A knowledge of the comparative values of the various feeds suitable for pig feeding should be of assistance in connection with planning a cropping scheme or in getting the greatest value for money spent when feed has to be purchased. The discussion which follows, when considered in

conjunction with the figures dealing with chemical composition should form a basis for evaluating the common swine feeds.

Oats.—Oats are one of the staple cereals of Alberta, and may well form a part of the ration for most classes of pigs. They may be used as part of the grain mixture for young growing pigs, brood sows, and breeding boars, but we would not recommend that they be fed as a sole grain to any class of pig unless they are the only grain available. There is a prevalent belief that good bacon hogs cannot be grown unless oats are used as a sole grain for young pigs, but we are led to the conclusion, as a result of our experimental work, that select bacon hogs can be produced by the use of such grains as wheat and barley in combination with oats, fairly early in the pig's life. The use of the heavier grains reduces the percentage of hull in the ration, and the young pigs are able to make better use of the feed consumed. Specific recommendations regarding the percentage of oats to feed to various classes of pigs will be made later.

Barley.—Barley has long been regarded as a desirable finishing feed for pigs in this country. Of recent years we have conducted a number of experiments with a view to determining the place of barley in the ration of young growing pigs, and we are led to conclude that a much larger percentage of barley than was formerly thought possible may be fed to advantage. It has been our experience that the higher the percentage of oats in proportion to barley fed, the more feed is required to make growth, and the smaller the returns for feeding. In this connection an average result of three experiments conducted during the years 1926-27-28 is presented. In these experiments the various grain mixtures were fed in conjunction with skim-milk to pigs running on pasture.

The results of these experiments appear to justify the conclusion that while oats have been considered a particularly valuable feed for bacon hogs, when the cropping scheme favors the growing of barley, or when the relative prices of these two grains is in favor of barley feeding, a higher proportion of barley than has been common may be safely and economically fed.

TABLE VI.—RESULTS OF FEEDING VARIOUS MIXTURES OF OATS AND BARLEY FROM WEANING TIME TO MARKET WEIGHT

	LOT I Oats 2 Barley 1	LOT II Oats 1 Barley 1	LOT III Oats 1 Barley 2	LOT IV Oats 1 Barley 3	LOT V Barley Alone
No of pigs	20	20	20	20	19
Av. Initial wt.....lbs.	35.71	36.11	36.15	36.15	35.79
Av. Final wt.....lbs.	205.36	203.01	203.09	203.06	205.02
Av. Daily Gain.....lbs.	1.28	1.31	1.33	1.35	1.37
Feed required for 100 lbs. gain:					
Grain	297.78	295.57	288.39	287.86	285.21
Skim-milk	580.56	568.77	557.04	551.66	551.33
Av. Profit per head over feed cost	$10.49	$10.89	$11.06	$11.21	$11.20
Live Grading of Hogs:					
Select Bacon	16	15	17	15	16
Thick smooth	4	5	3	5	3

Wheat.—Wheat has not been commonly thought of as a pig feed unless in the form of the frozen or lower grades, but of recent years, with the establishment of quotas and shortage of coarse grains in some areas, the place of wheat in swine rationing has been prominently to the fore. The introduction of new early maturing, high yielding varieties of wheat into the barley territory has also been a factor in drawing attention to the value of this cereal in pig feeding.

An experiment conducted at the University of Alberta during the fall of 1928, with a good grade of frozen wheat for finishing pigs weighing approximately 130 pounds indicated that good feed wheat had a slightly higher feeding value than 3 C.W. barley, 100 lbs. of wheat being equal to 116 lbs. of barley. In this experiment No. 3 and No. 4 wheat did not give any better results than the good feed wheat. With pigs selling at $8.00 per cwt. live weight, the wheat was marketed through pigs at $1.15 per bushel as compared with 50c per bushel at the elevator.

In an experiment conducted during the summer of 1929, when pigs were allowed to help themselves to ground wheat, oats and barley from separate self-feeders, they showed a decided preference for wheat, and the greater proportion of wheat consumed the smaller was the amount of feed required to produce 100 pounds of gain. The pigs fed wheat graded out well on foot and produced Wiltshire sides of desirable quality.

While in some areas it has been considered an extravagance to feed wheat to pigs, it would appear that this cereal could with profit be incorporated in our swine rations.

Comparative Values of Oats, Barley and Wheat

Some idea of the comparative value of the three common farm grains for growing pigs may be gained from an experiment conducted during the summer of 1933 with pigs starting on experiment with a weight of from 55 to 60 pounds

and carrying through until a weight of approximately 200 pounds was reached. These pigs were fed in dry pens without pasture. Tankage was added to the ground grains at a rate of 8% and the pigs had access to the simple mineral mixture outlined on page 44. In addition to groups being fed the individual grains, a fourth group was fed the three grains mixed equal parts by weight. The results of this experiment are shown in Table VII.

TABLE VII.—COMPARISON OF OATS, BARLEY AND WHEAT FOR GROWING PIGS

	LOT I	LOT II	LOT III	LOT IV
	Oats Tankage 8 per cent.	Barley Tankage 8 per cent.	Wheat Tankage 8 per cent.	Oats 1 Barley 1 Wheat 1 Tankage 8%
No. of pigs	9	7	9	8
Av. Initial wt.....lbs.	59.30	54.47	57.92	61.59
Av. Final wt.....lbs.	190.11	208.57	199.78	195.38
Av. Daily Gain.....lbs.	1.15	1.29	1.28	1.38
Feed consumed for 100 lbs. gain:				
Oats	408.47	.....	.....	107.67
Barley	.....	376.22	.....	107.67
Wheat	.....	.....	353.72	107.67
Tankage	35.52	32.71	30.76	28.09
Total Grain and Tankage...	443.99	408.93	384.48	251.10

It will be noted from the above table that the pigs fed barley and wheat grew at about the same rate and more than one-tenth of a pound per day faster than those fed oats. Wheat proved the most efficient grain, followed by barley and then oats on the basis of pounds of feed required to produce 100 pounds live weight of pig. In this experiment the amount of gain produced by 100 lbs. of ground oats was produced by 92 pounds of barley, 87 pounds of wheat and 79 pounds of grain when the three were mixed.

Rye.—This grain is grown quite extensively in some parts of Alberta, and in these areas is relied upon to a considerable extent as pig feed. Compared with the grains already discussed it is an inferior pig feed, lacking in palatability and inefficient in promoting growth when fed alone. In connection with experiments conducted in 1923 and 1924 with finishing pigs, it was found that the pigs took very unkindly to the rye when it was fed as a sole grain, and was only worth 70% as much as barley as a finishing grain. When mixed with oats and barley, or either grain alone, it could be used satisfactorily and economically.

Corn.—This cereal does not occupy a prominent position in pig feeding in Alberta, but improvement in varieties may extend the corn belt at least to the extent of making the crop available for hogging down purposes. On account of its tendency toward fat production and a slight softening effect on the carcass, corn is not favored as a bacon feed, but when

mixed with other grains and balanced with milk or other suitable supplements, it might constitute from one-quarter to one-third of the ration.

Screenings.—The question is often asked as to what part screenings may play in pig raising. Screenings of the quality of "standard recleaned" screenings, containing mainly small cracked grains, wild oats, and buckwheat, and free from the small weed seeds, constitute a useful pig feed. In an experiment conducted during the summer of 1926, pigs fed ground recleaned screenings along with 5% of tankage made an average daily gain of 1.09 pounds, and only required 394.0 pounds of feed to make 100 pounds of gain. The screenings actually cost $18.00 per ton, and were marketed through the pigs selling at $10.00 per cwt. at $50.80 per ton.

Again, in an experiment carried out during the winter of 1933-34 pigs fed standard recleaned screenings with 8% of tankage gained 1.28 pounds per day and required 454 pounds of the screenings for 100 lbs. live weight gain. Screenings which cost $7.00 per ton were marketed through $6.75 hogs at $30.20 per ton.

Weed Seeds.—While weed seeds are usually utilized in the form of screenings and are thus fed mixed with small or cracked wheat or other grains, there may be times of emergency when they constitute the only feed supply. Of the various weed seeds, wild oats can be utilized to best advantage, and in an experiment conducted during the winter of 1933-34 it was found that wild oats had as high a feeding value as good feed oats. Wild buckwheat has a fairly high feeding value and pig weed seed when mixed with grains can be made use of in pig feeding. In connection with an experiment conducted at the University of Alberta during the winter of 1937-38, when ground pig-weed seed was fed along with ground oats and barley and a supplement added in addition, it was found that pig weed seed had a feeding value of approximately 90% of that of oats. Seeds of the mustards and stink weed are objectionable and pigs will usually refuse to eat mixtures which contain these seeds in any quantity. All weed seeds should be well ground before feeding.

Shorts or Middlings.—Shorts or middlings have always been regarded as very desirable pig feeds. We conclude after a series of experiments that this feed can not be used with profit unless it can be purchased at a smaller cost per pound than grains are worth on the farm. They have been regarded as a traditional feed for pigs after weaning, but an average result of three experiments conducted in 1924-25-26 covering the month following weaning suggests that farm grown grains may take their place.

If farm grains are of poor quality or are not well ground, shorts will improve the palatability of a mixture and will have a higher feeding value than when good, well ground grains are available.

TABLE VIII.—SHORTS FOR WEANLING PIGS

	LOT I Oats 2 Barley 1 Barley 1 Skim-milk	LOT II Oats 2 Barley 1 Shorts 1 Skim-milk
No. of pigs	19	19
No. of days fed	28	28
Av. Initial wt. ....lbs.	34.37	34.58
Av. Final wt. ....lbs.	58.13	52.67
Av. Daily Gain ....lbs.	.86	.66
Feed required for 100 lbs. Gain:		
Grain	188.37	232.37
Skim-milk	542.16	664.39
Cost of 100 lbs. Gain	$3.84	$4.79

Bran.—Bran may with advantage be used up to one-half the ration for brood sows prior to farrowing and immediately after farrowing. It is cooling and laxative, and as a result is valuable as a sow feed. Under certain price conditions its use may be recommended for other classes of pigs, but ordinarily its place is limited in economical pig feeding.

Skim-milk.—This is a supplementary feed for pigs par excellence, and pig raisers who have skim-milk available are in a fortunate position. As a feed it is rich in protein required for the production of lean meat and in mineral matter required for the growth of a sound body framework. It is valuable in compensating for some of the deficiencies of farm grown grains, and when supplementing the cereals makes for very economical production. A good deal of Denmark's success in bacon hog production is attributed to the abundant supply of skim-milk in that country.

We are frequently asked as to the value of skim-milk, or what one could afford to pay for it if it could be purchased. Such a figure can best be arrived at by determining the amount of grain which it will replace in pig feeding. This was done in a series of experiments conducted in 1923-24-25 when the influence of skim-milk as compared with other supplements on the quality of the carcass was being studied. Our conclusions as presented in Bulletin No. 15 were as follows:

Grain Prices per pound	Value of Skim-milk per 100 lbs.
½c	16.43c
¾c	24.65c
1c	32.87c
1¼c	41.08c
1½c	49.03c
1¾c	57.05c
2c	65.74c

The value of skim-milk depends upon the rate at which it is fed; and in this connection we recommend the following proportions of grain and skim-milk:

Weaning time to 80 pounds.....2.5 lbs. to 1 lb. of grain
80 pounds to 125 pounds .....2 lbs. to 1 lb. of grain
125 pounds to market weight.....1 lb. to 1 lb. of grain

Buttermilk.—What has been said regarding the place of skim-milk in pig feeding holds equally well for buttermilk as it comes from the churn. Buttermilk diluted with wash water or containing a high percentage of any added materials will have a lower feeding value.

Tankage.—In tankage, which is a packing house by-product, consisting of thoroughly cooked and sterilized meat and bone scraps, Alberta farmers have a valuable pig feed and a useful substitute for skim-milk. Tankage serves as a combined protein and mineral supplement. Numerous experiments which we have conducted at the University of Alberta indicate the value of this supplement for young, growing pigs when skim-milk is not available. Space will not permit the presentation of any volume of data from these trials, but the following table, summarizing the results of a series of three experiments conducted during the summers of 1923-24 and 25, with pigs self-fed their grain and running on rape pasture, will give some idea of the value of this feed. In this experiment tankage was fed at the rate of 10 pounds to 90 pounds of grain throughout the trial. Tankage was valued at $50.00 per ton and skim-milk at 30c per 100 lbs.

TABLE IX.—A COMPARISON OF SKIM-MILK AND TANKAGE

	LOT I Grain Skim-milk Pasture	LOT II Grain Tankage Pasture	LOT III Grain alone Pasture
No. of Pigs in Lot	21	21	21
Av. No. of Days on Feed	119.5	129.0	214.2
Av. Daily Gain	1.31	1.24	.74
Feed required for 100 lbs. Gain:			
Grain	321.63	392.76	611.84
Skim-milk	694.96	....	....
Tankage	....	42.12	....
Cost of 100 lbs. Gain	$6.14	$5.97	$7.38

While tankage can be used satisfactorily as a single supplement, the volume available in Alberta in relation to the pig population tends to suggest that it can be used to best advantage when incorporated in mixed supplements.

Linseed Oil Meal.—While linseed oil meal may be fed to advantage in small quantities to brood sows before farrowing, and while nursing litters, it does not seem to have a high value as a sole substitute for skim-milk for growing pigs. In connection with experiments conducted during the

winters of 1925-26 and 1926-27 it gave the least satisfactory results of a number of supplements tested from both the standpoint of rate of gain and feed requirements.

Alfalfa Meal.—Good, green alfalfa meal, particularly when made from fine leafy hay, has proven a valuable protein supplement in our winter feeding experiments when the feeding of grain with 5% of alfalfa meal has been checked against the feeding of grain alone, but in comparison with tankage or a mixture of the supplements it has not rated high. Its high fibre content tends to cut down the rate of growth. Its value in the feeding of growing pigs appears to lie in its being fed in small proportions in a combination supplement or fed by the free choice method on farms where it can be produced. In addition to supplying protein, alfalfa is a good source of vitamins A and D, both of which are important in pig feeding.

Alfalfa meal is a very valuable feed for brood sows and may be fed at the rate of 10 to 20% of the grain ration.

Fish Meal.—In European countries fish meal is used quite extensively as an addition to the grains in pig feeding. In Denmark, where it can be economically purchased, it often constitutes 10% of the meal mixture. A considerable volume of this feed is being manufactured at the Pacific coast, but under usual price conditions its general use as a single supplement cannot be recommended. It may be added in limited quantities to improve a supplemental mixture.

Mixed Supplements or "Hog Concentrates".—Each of the individual protein and mineral supplements already mentioned can be used to advantage in pig feeding. However, the best results from the standpoint of rapid gains and economical production are usually secured when several of them are blended together in such proportions as will provide a complete mixture. This process can be carried out on the farm by buying the various ingredients and mixing them according to a standard formula. Difficulty is experienced sometimes in the weighing out of the individual materials and getting a good "mix" is difficult unless a mechanical mixer is available. As the same time the labor involved is considerable.

The alternative is to purchase ready mixed protein—mineral supplements which are commonly referred to as "hog concentrates". The mixtures offered to swine raisers by reliable feed companies are made according to standard specifications which have been drawn up on the basis of experimental findings. They provide protein, minerals, and vitamins in satisfactory proportions and amounts and the feeder may feel reasonably certain that, if these supplements

are added to the grain in the proper amounts, and well mixed, good results will follow.

The mixing and sale of feeds by commercial concerns is regulated by the Dominion Department of Agriculture through the Feeding Stuffs Act. The feeds must meet certain specifications provided for in the Act and on the outside of the bag will be found information relating to the percentage of important ingredients. The feeder should check this declaration so that he may be familiar with the quality of the feed which he is purchasing.

A combined protein and mineral supplement which has proven reliable may be made up as follows:

Tankage	50 lbs.
Linseed Oil Meal	25 lbs.
Fish Meal	15 lbs.
Ground Limestone	5 lbs.
Salt	5 lbs.
Total	100 lbs.

This mixture may be modified in a number of different ways. For example 10 pounds of alfalfa meal may be added and the amount of linseed oil meal or fish meal reduced accordingly. In times of shortage of tankage the amount of this ingredient may be lowered and the percentage of alfalfa meal or other supplements increased. The actual composition of the mixture may be varied according to the price and availability of individual feeds.

Since tankage is the basic ingredient of most "hog concentrates" and since it may normally be bought and used by itself the matter of its value in relation to the "mixture" is of some interest. A glance at the table on page 32 will show that tankage contains 50% of protein while the supplements of plant origin contain this constituent in smaller amounts. The addition of such feeds as linseed oil meal and alfalfa meal to tankage will result in a lower protein content in the mixture but due to the better combination of proteins in the blended feed each pound fed will usually replace a larger amount of grain and the value of one pound of the mixture as compared with one pound of tankage is thereby increased.

The mixture suggested above contains approximately 42% protein. We have found in comparing this mixture with tankage, as a supplement to a grain ration, that it will promote slightly higher daily gains and on the basis of extra grain saved is worth approximately 20% more per 100 pounds than tankage. In other words if tankage is worth $40.00 per ton the mixed concentrate is worth approximately $48.00 per ton.

Since, as has been mentioned already, most mixed supplements contain less protein (for example 40%) than tankage (50%) they should be fed in slightly higher amounts. Whereas 10% of tankage added to the grain will be satisfactory for young pigs and 5% for pigs over 110 lbs. in weight, the mixture should be added at the rate of 12% and 6%.

In the discussion regarding the feeding of different classes of swine which follows it is assumed that the majority of swine feeders will be using a mixed supplement or "hog concentrate" containing approximately 40% of crude protein and recommendations will be based upon this assumption. The term "supplement" will be used in this connection.

A Balanced Ration.—While the addition of one or other of protein or mineral to a mixture of farm grains will bring about improvement in the performance of growing pigs it requires both to balance the ration properly and insure best results. This is indicated by the results of a series of experiments conducted at the University of Alberta during the years 1932 to 1934. Four groups of pigs were included. One group was fed on grain alone, one had ground limestone added to the grain, and a third had both protein and mineral added. The pigs were fed inside the piggery; 1% of salt and 1% of cod liver oil were added to the feed mixture in all lots. The results are shown in the following table:

TABLE X.—PROTEIN AND MINERAL ADDED TO GRAIN

	LOT I	LOT II	LOT III
	Grain Alone	Grain Mineral	Grain Mineral Protein
Average Initial wt. (lbs.)	50.7	50.3	50.1
Average Final wt. (lbs.)	139.1	166.9	200.6
Average Daily Gain (lbs.)	.69	.92	1.27
Feed Eaten per Day (lbs.)	3.64	4.35	4.75
Feed required for 100 lbs. increase in wt.	524.8	471.9	373.2

It will be noted that the addition of mineral alone contributed to improvement but more feed was eaten per day, the average daily gain was increased and the feed requirement for 100 pounds gain was lowered when both protein and mineral were fed.

Roots.—While roots may not be regarded as a necessity in pig feeding in Alberta, when they are available, they can be used to good advantage. They are of use for brood sows, providing bulk and succulence, but for growing pigs they tend to utilize too much valuable space in the digestive tract. Potatoes may be boiled and mixed with grain and in this way marketed through pigs in years of low potato prices. In an experiment along this line conducted during the winter of 1922, it was found that 411 pounds of cooked potatoes equalled 100 pounds of grain in feeding value.

Pasture Crops.—Pasture crops should be utilized extensively in Alberta in connection with pig raising unless sanitary feeding pens are available and the proper balancing of rations can be undertaken. If skim-milk is plentiful or other substitutes can be liberally supplied there may be no serious need for pasture accommodation, but under the average conditions prevailing, good pasture crops will do at least two things: (1) provide more sanitary conditions than usually prevail in the pens and yards and thus to a considerable extent avoid the possibility of disease infection and worm infestation; (2) allow the pigs the opportunity of securing some of the protein, minerals and vitamins which may be lacking especially when skim-milk is not available.

Experiments conducted at the University of Alberta in recent years indicate that when supplemental feed is not available, one may expect from 30 to 50 per cent. more rapid gains and a decrease of from 20 to 30 per cent. in the cost of making gains when pasture crops are used as compared with feeding in the dry lot. When proper supplements are fed pasture crops do not make such a good showing.

Fig. 9.—General view of experimental groups of pigs on pasture at the University of Alberta.

Crops which have been tested experimentally as hog pastures are: rape, alfalfa, sweet clover, sunflowers, mixtures of oats and fall rye, and a cereal mixture consisting of equal part of oats, barley and wheat. Alfalfa has proven a very valuable pasture crop for pigs, making an early start in the spring and providing a bulk of forage throughout the

season. Where alfalfa can be grown it is undoubtedly the peer among swine pastures. Rape has stood next to alfalfa in our experiments. While it does not provide pasture as early as alfalfa, it has a wonderful carrying capacity under Edmonton conditions and maintains a growth until late in the season. It might be stated, however, that good results have been secured from all of the crops tried experimentally. The crops selected will depend upon local conditions, and on this point we conclude that the choice of a crop is really secondary to making provision for green forage in some form.

For the benefit of those who hesitate to use a pasture crop for their pigs on account of the tendency of pasture to cause "blistering" or "sunscalding," we would say that when suitable shelter is provided close to the feed trough or self-feeder, blistering will be reduced to a minimum. When pigs do become so afflicted, a liberal application of mineral oil to the affected parts will generally alleviate the condition.

The following table will show the relative performance of two groups of pigs, one self-fed grain in dry lot and the other self-fed the same ration on rape pasture. Tankage was fed at the low level of 5% of the grain ration in both cases, and a small allowance of buttermilk was fed in addition for the first month after the pigs were put on test. Results are based on an average of three experiments conducted during the pasture seasons of 1923, 1924 and 1925.

TABLE XI.—DRY LOT AND PASTURE FEEDING COMPARED

	GROUP I Dry Lot	GROUP II Rape Pasture
No. of Pigs	22	50
Av. Initial wt.	46.18	45.8
Av. Final wt.	117.25	158.8
Av. Daily Gain	.74	1.16
Feed required for 100 lbs. Gain:		
Grain	510.94	328.5
Tankage	25.57	20.14
Buttermilk	118.4	77.5

In connection with the use of pasture crops for pigs being fed for market, it should be kept in mind that pasture is used as a supplement to grain feeding rather than as a sole means of maintenance as in the case of cattle or sheep. Only in extreme cases of grain scarcity should pigs be forced to graze on pasture without grain or with a very small grain allowance. Best results are secured when pasture is used in conjunction with liberal grain feeding.

Brood sows can make particularly good use of pasture and every effort should be made to supply them with fresh forage from early summer until fall.

Pasture lots for market pigs should not exceed from one-half acre to one acre in size, and where a larger area is required, cross-fencing is strongly recommended.

Mineral Supplements. — In order that they may grow rapidly, pigs require an adequate supply of mineral matter for skeletal growth. This mineral matter is lacking in our ordinary farm grown grains and unless the deficiency is made up for by adding certain minerals to the feed a lack of thrift is likely to develop and such acute conditions as "stiffness", "rickets", etc., may arise. Apart from the minerals required for bone growth, the main one being lime, such minerals as iodine, which prevents the birth of "hairless pigs", and iron, which prevents anemia in young pigs, may be lacking. Conditions arising from a deficiency of these elements will, however, be mentioned under the section dealing with "swine diseases". Salt is required by pigs in small amounts.

Fig. 10.—Pigs will try to "mine" their own minerals if mineral mixtures are not provided. It is better to supply the necessary minerals and save the pigs' energy.

A simple mineral mixture which may be used with good results by keeping it before the breeding stock and growing pigs in some such self-feeder as shown on page 86 may be made up as follows:

Ground limestone	40 lbs.
Bone meal or Mono-calcium phosphate	40 lbs.
Salt	20 lbs.

If a mineral mixture, either home-made or commercial, is not being self-fed or if one has reason to believe that other supplements which have been added to the grain do not sup-

ply sufficient mineral, 1 pound of ground limestone and ½ pound of salt may be mixed with each 100 pounds of the grain mixture.

That pigs respond to the feeding of ground limestone when there is a lack of this mineral in the feed is shown by the results of an experiment conducted during the winter of 1935-36. Two groups of pigs were fed in the piggery during the winter months on a grain mixture of equal parts of ground oats, barley, and wheat with the addition of salt and cod liver oil. One lot had ½ pound of ground limestone added to each 100 pounds of grain.

TABLE XII.—FEEDING GROUND LIMESTONE

	LOT I	LOT II
	Grain No mineral	Grain ½% Ground Limestone
No. of pigs in Lot	7	7
Av. No. of Days fed	161	155
Av. Initial wt.....lbs.	46.07	44.62
Av. Final wt.....lbs.	176.29	206.0
Av. Daily Gain.....lbs.	.81	1.04
Feed required for 100 lbs. Gain:		
Grain	514.14	467.07
Mineral	.....	2.35
Cost of 100 lbs. Gain	$4.23	$3.88

The pigs which did not receive the mineral grew more slowly and required more feed to make their gains than those fed the ground limestone and in addition two pigs in Lot I became badly crippled during the experimental period.

Fig. 11.—Pigs which are not receiving sufficient mineral will become crippled. This group of pigs was fed during the winter of 1933-34 at the University on a ration lacking mineral.

Fish Oils.—Cod liver oil, pilchard oil and certain blends of fish oils are used extensively in poultry feeding and can be used to good advantage in the feeding of young pigs, especially when the system of management involves confinement in the piggery after weaning. The fish oils contain

important vitamins, A (for growth) and D (for bone building). We have carried out a number of experiments at the University of Alberta in connection with the use of fish oils of commercial grade in the feeding of pigs confined to the piggery and not allowed access to sunlight. We have found that these oils as a rule improve the growth and assist in preventing crippling. The results secured will depend to a considerable extent upon the mineral content of the ration.

Most commercial supplements contain the essential vitamins in sufficient amounts. If commercial supplements are not being used it will be well to add fish oil to the feed at the time of feeding.

The amount to be fed will depend upon the quality of the oil being used. Many of the oils commonly available at present are rated at 3,000 units of vitamin A and 400 units of vitamin D per gram, and when fed at the rate of one teaspoonful per day per pig until a weight of from 70 to 100 pounds is reached, satisfactory results should be secured. If mixed with the grain before feeding ½ pound to 100 pounds of grain should be sufficient. Oils which are rated at lower strengths will have to be fed in proportionately larger amounts.

Preparation of Feeds

Cooking.—It was a common practice on many farms in earlier days to cook practically all feeds for pigs, but experimental work and private experience has shown that cooking decreases the digestibility of most feeds, and adds to the cost of production. Many still feel that winter pigs do better when the feed is cooked, but on the basis of three experiments conducted during the winters of 1920-21, 1921-22, and 1922-23, when cooked grain was compared with dry grain fed from the self-feeder, we conclude that the expense of cooking the grain is not warranted. Such feeds as garbage and potatoes are better cooked, but the common grains are more economically fed without cooking. When economy is not an object, slightly better daily gains may be secured with cooked feed, and the palatability of certain mixtures may be improved.

Soaking.—Soaking grain does not seem to be good practice. Even when whole grain is soaked, conditions are not improved; this occurrence is indicated in an experiment conducted during the winter of 1931-32 at the University of Alberta. Pigs fed whole dry grain (oats and barley) gained at the rate of .98 pounds daily and required 455.35 pounds of grain for 100 pounds of gain, while those fed the same mixture after soaking between feeds gained only .76 pounds daily and required 515.26 pounds of grain to make the 100 pounds gain.

Grinding.—We are asked from time to time whether or not it pays to grind grain for pigs. This question is of special interest in times of low prices for grain and hogs. Related to this question is one concerning the degree of fineness to which grain should be ground for pigs. In an experiment carried on during the summer of 1931, it was found that there was little difference in the rate of growth whether pigs were fed fine, medium, or coarsely ground grain, but that the finer the grinding the less grain was required to make 100 pounds increase in live weight. Based on feed requirements for gain, 100 pounds of finely ground grain was worth 104 pounds of medium ground and 112 pounds of coarsely ground grain. In connection with another experiment conducted during the winter of 1931-32 the grinding of grain resulted in the pigs making faster gains as compared with whole grain feeding. It would appear that moderately fine grinding is to be recommended with the ordinary grains if such a treatment can be given the grain at moderate cost. Wheat should not be too finely ground for pigs; a rather sharp, gritty texture is best.

Methods of Feeding

There are two methods of pig feeding commonly practised: (1) the hand-feeding method, feeding the grain either wet or dry twice or three times daily, and (2) the self-feeding method, where the self-feeder is used and grain is kept before the pigs at all times.

The method to be recommended will depend upon the number of pigs to be fed, the amount of grain on hand, and the rate of gain desired. The relative merits of the two systems have been extensively studied experimentally. The problem was carefully considered in a series of three experiments conducted at the University of Alberta during the summers of 1923, '24 and '25. Hand-feeding was compared with self-feeding with respect to rate of growth and feed requirements and with regard to their influence on the type of pig and quality of carcass produced. In view of the importance of this question the conclusions drawn from these experiments as quoted from a previous bulletin are as follows:

"Self-fed pigs invariably made more rapid gains than those that were hand-fed. In one case the feeding period was shortened by twenty days and in another by thirty-three days. In years of normal market trends, particularly with early spring pigs, this shortening of the feeding period makes possible marketing before the later season slump occurs. In the final analysis the scale of operations will usually determine whether self-feeding or hand-feeding shall be practis-

ed. When one or even two litters are being fed, the labor cost does not loom large, but when operations are conducted in a fairly large way, the labor saving properties of the self-feeder come to the fore, and tend to compensate for the slightly higher feed bill which is induced by this method of feeding. Self-feeding gave eminently satisfactory results in the development of pigs of select grade. A higher percentage of selects and a larger number of suitable Wiltshires were graded out of the self-fed groups, indicating that the self-feeder did not lead to too early maturity and the development of a short thick type of pig."

The experiments suggest that a good deal of labor and often drudgery can be saved by the use of a properly constructed self-feeder, and pigs of the proper type can be economically produced by this method of feeding. Particulars regarding construction of self-feeders will be found on pages 84 and 85.

Inside Pig Production

When permanent, sanitary hog houses are available, and when skim-milk or suitable substitutes are provided in adequate amounts, a system of intensive inside pig feeding can be followed. Pigs may be pen fed satisfactorily from the time they are weaned until ready for market. This system involves more labor but the investment in pasture land and fencing is eliminated and the difficulty of sun scalding with white pigs is overcome.

Experiments conducted at the University of Alberta during the summers of 1934 and 1938 indicated that pigs full fed a well balanced ration and pen fed from weaning time until ready for market, made slightly more rapid gains and required less feed to make 100 pounds gain than similar pigs fed the same ration when running on pasture. The saving in feed amounted to approximately 30 pounds for each 100 pounds increase in live weight of the pigs. Pigs were finished for market without difficulty at around six months of age.

Inside pig production makes it necessary to study carefully the proper addition of supplements to the farm grown grains. If the protein, mineral and vitamin requirements of pigs are not taken care of under such a system, disappointing results are apt to follow.

Care of the Breeding Boar

Since the breeding boar is at least half the herd, it would seem appropriate to commence a discussion of feeding and management methods with this member of the breeding herd and follow through with the sows and growing pigs.

The boar, like the stallion, on many farms is apt to be a neglected animal. In many cases he is confined to a small pen with very high walls, little provision being made for exercise or company which will help in keeping him from becoming bad tempered.

The ideal treatment for a boar during the summer season is the run of a good pasture lot with just sufficient grain to keep him in good vigorous breeding condition. Young growing boars should receive about 1 pound of grain daily to each 100 pounds of live weight when on good pasture and mature boars from ½ to ¾ pounds of grain daily per 100 pounds live weight. The aim should be to not permit the breeding boar to become too fat and still have him in good vigorous condition. If pasture is not available green-feed may be supplied to the boar in his pen.

During the breeding season the boar's feed allowance should be increased, and as palatable feeds as possible fed, as many boars, especially of the bacon type, are apt to go off feed at that time. A mixture of equal parts of oat and barley chop or two parts oats, 1 part barley and 1 part wheat, along with a small allowance of skim-milk, or from 6% to 10% of supplement, should prove satisfactory for the breeding boar.

Young boars should not be used for breeding until they are from 8 to 9 months of age, and not used too extensively during the first season. The young boar should not be used more than once a day and not permitted to serve a sow more than once. It is a mistake to allow a young boar to run with the sows and breed indiscriminately. Boars in run-down condition are apt to sire small and weakly litters.

When more than one boar is kept it is a good plan to allow the boars to run together between breeding seasons. Mature boars should have their tusks removed before turning together, and the occasion of their meeting should be a cool day. The breeding boars run together regularly at the University Farm and no trouble has been experienced in handling them in this way. In tusking boars a noose of stout rope is passed around the upper jaw and made fast to a post or railing in the pen. The tusks are usually quite exposed, and may readily be removed with a pair of bolt cutters or by the use of a crowbar and cold chisel. The first method is much to be preferred, but if the bolt cutters cannot be procured, the sharp edge of a crowbar may be placed against the base of the tusk and held firmly by one operator while the other strikes with the cold chisel and hammer directly opposite the edge of the crowbar.

Care of the Brood Sow

Having secured the right type of brood sow, much of the year's success in pig raising depends upon how she is fed and handled just prior to breeding and during the pregnancy period. Sows which are bred when in good condition, or at least gaining in weight if they have just weaned a litter, and are well nourished during the pregnancy period, are much more likely to farrow big strong litters than sows which have been thin and run down when bred and poorly cared for before farrowing.

Fig. 12.—Brood sows should have access to good pasture during the summer months. The above illustration shows a few of the sows at the University Farm on their summer pasture.

Sows should if possible have the run of a good pasture during the summer months. With good pasture, water and shade, little grain feeding will be necessary, especially with mature sows, unless they are quite thin when their litter is weaned. Young growing sows should have grain during the pasture season if they are to be given a chance to develop properly. From ¾ to 1 lb. of grain per 100 lbs. live weight daily along with good pasture will bring the young sow along in good condition. As the time approaches for breeding the sows may be given some extra grain if they do not seem to be in the proper state of thrift.

During the winter months and while the sows are carrying an unborn litter, they should be obliged to take a reasonable amount of exercise and should be fed feeds which supply plenty of protein, the material required for tissue growth, mineral matter required for the growth of a good skeleton in the newly farrowed pigs, as well as such essential vitamins as A and D. Sows which have been fed rations lacking in mineral, particularly lime, are apt to farrow weak pigs and they may fail to milk properly after farrowing. A shortage

of vitamins A and D will contribute to weakness and blindness in new-born pigs, as well as lack of resistance to infection during the first few weeks of life.

It is a good plan to arrange to have the sows' shelter at some distance from the place where they are fed so that they may be forced to walk a considerable distance for feed. With regard to shelter, the main requirements are a dry bed and freedom from draughts and overcrowding. Sows are successfully sheltered through the winter on many farms in straw stacks or straw-pole shelters where a framework of poles is constructed and straw blown over the frame. At the University of Alberta brood sows have been successfully wintered for several years in colony houses of such type as shown on page 66. These colony houses when banked with straw provide good accommodation for from three to four sows, depending upon their age.

Feeds for the Brood Sow

The ordinary farm grown grains, such as oats, barley and wheat, may form the basis for suitable winter rations for brood sows. Such mixtures as the following have been used satisfactorily at the University of Alberta:

Oats 1 part		Oats 2 parts
	or	Barley 1 part
Barley 1 part		Wheat 1 part

Oats are the safest single grain for brood sows, but there is an advantage in adding some wheat or barley to the oats. Barley and wheat alone are too fattening for sows, and may tend to cause weak pigs and a lack of milk at farrowing time.

With mature sows it is not necessary to feed a large amount of supplementary feed apart from alfalfa meal of good quality or even good, well cured alfalfa hay. Alfalfa meal may be mixed with the grain at the rate of from 10% to 15% and if the alfalfa cannot be ground and fed in this way, it may be placed in feed racks or fed on the ground. If alfalfa is not available a sweet clover may be substituted or even green oat sheaves will be helpful. With young sows which will farrow their first litter, such foods as skim-milk or buttermilk or tankage are a great benefit. Our young sows at the University are fed approximately 8% of tankage or 10% of supplement in addition to having access to green, second cut alfalfa hay. If roots are available they can be fed to advantage to the sows. One pound of bran added to the feed daily for two or three weeks before farrowing will exercise a laxative and cooling influence.

Fig. 13.—Young sows which will farrow their first litter should be well fed during the winter months.

Grains may be fed ground and either slopped or dry. At the University of Alberta we follow a plan of feeding whole grains at the morning feed, sprinkling it on the frozen ground so that the sows are encouraged to take plenty of exercise in gathering the grain from the ground. The evening feed is fed in the form of slopped, chopped grain.

In order to convey some idea as to the amount of grain required to carry sows through the winter feeding period, and the daily amount necessary to bring sows through the winter in good condition, the following daily allowances are suggested:

Mature sows: .8 to 1 lb. per 100 lbs. live weight during the first 12 weeks —1.2 to 1.3 lbs. last 4 to 6 weeks.
Yearling sows: 1.4 to 1.6 lbs. per 100 lbs. live weight during pregnancy.
Gilts: 1.2 to 1.7 lbs. per 100 lbs. live weight during pregnancy.

In districts where there is any likelihood of hairless pigs being farrowed, in fact under practically all Alberta conditions, the feeding of potassium iodide, or the administration of iodine in some form to the pregnant sows, is strongly to be recommended. Particulars regarding this treatment will be found under "Swine Diseases."

A simple mineral mixture such as the one outlined on page 44 should be kept in front of the sows at this stage.

Care at Farrowing Time

Farrowing time is the critical time in the pig business. Heavy losses are apt to occur here unless care is exercised. It is estimated that 30% of the pigs farrowed are lost each year between farrowing and weaning time. A pig which dies at farrowing does not represent a heavy loss, but it means one pig less at marketing time.

The following farrowing time precautions are suggested:

(1) Provide suitable farrowing accommodation for sows farrowing during the winter and early spring months. Some form of artificial heating is highly desirable and may be provided in the form of a "brooder house," a piggery heated by a stove or other suitable means, or electric pig brooders.

(2) Remove the sow from her winter shelter to a suitable farrowing pen at least one week before she is due to farrow, making plenty of provision for exercise at this time. The length of the pregnancy period in the sow is from 112 to 114 days, or 3 months, 3 weeks, 3 days. It generally pays to bring the sow into some pen where she can be supervised at farrowing. The sow which comes out of the straw stack with thirteen pigs is loudly proclaimed, but the sow which comes out alone after farrowing does not get any publicity.

(3) Properly clean and disinfect the farrowing pen before the sow is placed in it, and where worm infestation is suspected in pens that are regularly used for farrowing, it is recommended that the floors be scrubbed with a strong solution of lye in boiling water (1 lb. of lye to 40 gallons of water). This destroys the worm eggs and prevents the little pigs becoming contaminated while in the farrowing pen.

(4) Provide a guard rail around the side of the farrowing pen. This rail, which may constitute a 2″×4″, or a small pole, should be placed approximately 8 inches from the floor and projecting out 6 inches from the wall. This guard rail allows the small pigs to seek protection when the sow lies down, and is a wonderful means of avoiding loss by crushing.

(5) Avoid long coarse straw in the farrowing pen. The newly-born pigs may become either tangled or buried in the long straw, and thus are more likely to be crushed. Cut straw or chaff makes the most suitable bedding for the farrowing pen.

(6) In connection with winter and early spring farrowing, especially, the sow should be watched carefully at farrowing time so that help can be given in case of weak pigs or an irritable sow. If the small pigs have become chilled they may be revived by placing them in a box near the stove, or individual pigs may be wrapped in a warm blanket or immersed up to the neck in warm water. When the sow is irritable or clumsy, it is a good plan to remove each pig as it is born and return the complete litter for nursing when farrowing has been completed and the sow is resting quietly.

(7) Remove the small tusks, or "black teeth" as they are commonly called, from the mouths of the small pigs within a few hours after they are born. These sharp teeth irritate

Fig. 14.—Remove the small tusks or "black teeth" as soon as possible after the pigs are born.

the sow's udder and cause cuts and scratches on the faces of the pigs while fighting at nursing time. The job can be done with small nippers made for the purpose.

Feed and Care of Sow and Litter

Beginners are often anxious to feed the sow heavily immediately after farrowing. Nothing is more detrimental to her welfare. She should not be allowed anything but lukewarm water for the first 24 hours after farrowing. Following that, the first feeds given should contain a high percentage of such feeds as bran, shorts and oats. Bran or shorts on hand at this time can be used to advantage. The feed may be gradually increased and heavier feeds added until the sow is on full feed in from a week to ten days.

The most satisfactory ration at this time is one that includes either skim-milk or buttermilk. These feeds naturally tend to stimulate milk flow and preserve the body weight of the sow, and in addition, as the young pigs learn to eat from the mother's trough, they make more rapid growth when skim-milk forms a part of the ration.

An experiment conducted at the University of Alberta during the spring of 1923 indicates how milk during the nursing period saves the body weight of the sow. Sows receiving a mixture of oats, barley and shorts slopped with water lost an average of 1.53 lbs. per day in body weight during an 8-week suckling period and weaned pigs weighing 25 lbs., while sows receiving oats, barley and buttermilk only lost .41 lbs. per day and weaned pigs averaging 26 pounds. Weight lost by sows while nursing a litter must be recovered either before they farrow again or go to market, as the case

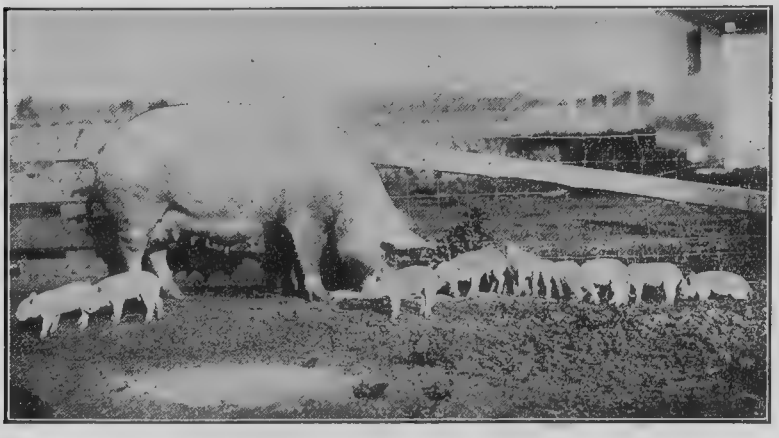


Fig. 15.—Yorkshire sow with litter of twelve pigs at the University of Alberta. The nursing sow should be liberally fed to stimulate milk production.

may be, so that feeding to maintain the condition of the sows as well as to stimulate milk flow is a matter of importance.

After the first few days oats, barley and wheat may be used satisfactorily for the nursing sow. We have found the following mixtures satisfactory:

Oats 1 part		Oats 1 part		Oats 2 parts
	or		or	Barley 1 part
Barley 1 part		Wheat 1 part		Wheat 1 part

Some may prefer to feed a higher proportion of oats than suggested above, but unless they are much cheaper than wheat and barley, the practice would not be justified.

When skim-milk or buttermilk are not available, the addition of 12 lbs. of supplement to each 100 lbs. of grain is to be recommended.

Care of the Litter Before Weaning

Prevention of Anemia.—When pigs are born during the winter and early spring months and are confined to the piggery, special care must be taken to prevent the development of anemia. This condition may cause serious direct and indirect losses and should be guarded against. For treatment refer to "Swine Diseases," page 92.

Creep Feeding.—The small pigs will begin to eat from the mother's trough when they are around three weeks of age. When they reach this stage it is better to provide them with a separate trough or small self-feeder, as a hungry sow may throw the small pigs against the edge of the trough or the wall and injure or even kill them. If the pen is large enough,

it is a splendid scheme to partition off a corner leaving an opening where the small pigs may go in for feed but where the sow cannot enter. This is most feasible where the sows and litters are running out in large lots, but suitable arrangements may be made even in pens 10′×12′ in size. Grain may be placed in a small trough or self-feeder in such a creep and the small pigs may help themselves as they please. This is a good preparation for the weaning period.

Fig. 16.—Grain may be placed in a "creep" in the corner of the pen and the small pigs may help themselves as they please.

Suitable mixtures for feeding in creeps may be made up as follows:

Hulless oats	73 lbs.	Hulless oats	73 lbs.
Barley	10 "	Barley	10 "
Wheat	10 "	Wheat	10 "
Tankage	3 "	Tankage	5 "
Fish meal	2 "	Ground limestone	1 "
Ground limestone	1 "	Fish oil	1 "
Fish oil	1 "		
	100 lbs.		100 lbs.

The grains should be ground medium finely. If hulless oats are not available, ordinary oats may be used, but it is desirable that the hulls be sifted out as very small pigs cannot digest the coarse hulls, and in addition, the sharp hulls may cause digestive troubles. If skim-milk is available, the tankage and fish meal may be eliminated from the mixtures suggested and the milk may be fed along with the grain mixture.

Commercial "pig starters" may be used to good advantage at this stage, particularly if skim-milk is not available. They contain grains and a variety of supplements in suitable proportions and make up a complete feed. The use of such

"starters" cuts down on the amount of labor involved in mixing feeds and avoids the necessity of purchasing and weighing out of small quantities of a number of supplements.

Castration.—Male pigs from all grade sows and male pigs from pure-bred sows which are not good enough to be kept for breeding purposes should be castrated at six weeks of age. Many farmers hesitate to castrate pigs, and prefer to have a neighbor or itinerant handy-man do the job, but the operation can be safely done if a few simple precautions are observed.

Cleanliness, a sharp knife, a fairly generous incision coming well down on the scrotum to permit drainage, and a disinfectant in the wound are the main precautions. For a number of years students have obtained practice in castration of young pigs at the University swine barn, and no casualties have ever occurred.

Ruptured pigs present more of a problem in castration. This trouble is known to be hereditary, although in some cases it may be caused by sows lying on the pigs. Ruptured pigs should be kept off feed for some time before castration. The pig should be held up by the hind legs and the front end held rigidly to prevent a struggle. In making the incision only the skin of the scrotum should be cut, care being taken not to cut the membrane or sac which covers the testicle. The testicle should then be drawn out enclosed in the membrane, and the intestines kept well pushed back. When the testicle has been drawn out far enough, tie a strong string around the cord of the testicle, including the membrane, and then cut away the testicle and surrounding membrane just outside of where the string was tied. The end of the string about three inches long may be left to hang outside the wound. Some prefer to stitch the wound in order to reinforce the wall of the membrane holding back the intestines. Plenty of disinfectant should be used at all stages of this operation.

Identification.—Where pure-bred pigs are kept, the pigs must be identified under eight weeks of age. White colored breeds, such as Yorkshires and Chester Whites, must be identified by tattoo marking. This is a regulation of the Canadian Swine Breeders' Association. Breeders are allotted identification letters for their exclusive use. The herd identification letters are tattoed or tagged in one ear and the number of the animal with designating year letter is placed in the other ear. As the pigs must be tagged when quite small, care should be taken to insert the tags well down toward the base of the ear so that permanent drooping of the ear may be avoided. The tattoo and tag methods of identification are official. Another method which may be adopted

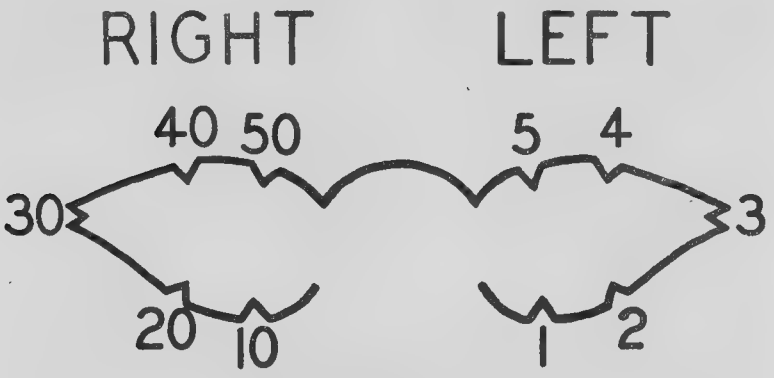


Fig. 17.—System of notching pig's ears for identification purposes. (Reproduced from "Productive Swine Husbandry," by Day.)

for private use is the ear notching system in connection with which a "V" shaped notch is cut out of the edge of the ear with an ear notcher. A convenient marking system for up to 100 pigs is shown in Fig. 17.

It will be noted that various combinations may be worked out, using notches in one or both ears. While pig No. 5 will only have one notch in the upper part of the left ear, pig No. 8 will have two notches, one at the upper side and one at the tip of the left ear. Likewise pig No. 32 will have one notch in the tip of the right ear and one in the lower centre of the left ear.

Feeding Pigs After Weaning

If two litters per year are to be raised, pigs should be weaned at eight weeks of age. Some wean pigs at six weeks regardless of conditions, but pigs weaned at this age are handicapped as compared with those weaned later. If only one litter is to be raised by the sow during the year and skim-milk is scarce, there may be some advantage in letting the pigs nurse until they are 10 or 12 weeks old.

The weanling stage is the critical period in the pig's life, and a special effort must be made to carry the young pig over from the mother's milk period of his existence to a point where his digestive organs become accustomed to large amounts of solid food. It must be remembered that whole milk is rich in protein and minerals and contains certain vitamins that are essential for growth and health. If a sudden change is made to a feed mixture which is very coarse in texture or is seriously lacking in the essentials mentioned, digestive disturbances are apt to develop, resistance to infection will be lowered and serious losses may follow.

If the pigs have been well acquainted with the feed trough and a good combination of feeds before weaning (preferably by the use of a "creep"), the chances of a weaning set-back developing will be avoided to a large extent.

Protein: The best substitute for the mother's milk is skim-milk or fresh buttermilk and if these are not available some substitute should be provided. A properly blended protein-mineral mixture will serve as a good substitute for milk at this stage.

The supplement may be mixed with the grain at the rate of 6 pounds to 94 pounds of grain for the first week after weaning, increasing gradually up to 12 pounds in 100 pounds of feed mixture and keeping it at this level until the pigs reach a weight of around 110 pounds when it should be reduced again to 6%.

Fig. 18.—Litter mate pigs at five months of age. The pig on the left weighed 107 lbs. and the one on the right weighed 197 lbs. Feeding skim-milk made the difference.

To indicate the advantage of using some form of substitute when milk is not available the following table is presented. Three groups of pigs were included in an experiment during the winter of 1939-40 and checked through the after-weaning stage, one group getting grain alone, one tankage as a milk substitute, and one skim-milk.

TABLE XIII.—SUPPLEMENTS FOR PIGS AFTER WEANING

	GROUP 1 Grain Alone	GROUP 2 Grain Tankage	GROUP 3 Grain Skim-milk
Number of Pigs	8	8	8
Average Daily Gain during 6 Weeks after Weaning	.34 lbs.	.67 lbs.	1.01 lbs.

Vitamins: If the pigs are weaned during the late fall, winter or early spring months, and especially if confined to the piggery, it is advisable to feed them some fish oil for at least the first month or six weeks after weaning. This will assist in preventing symptoms of vitamin D deficiency (crippling) and vitamin A deficiency (poor growth, staggering and dizziness) and may help in improving resistance to infection (see page 45).

Mineral: If weanling pigs are receiving plenty of skimmilk, or if supplements are being fed along the lines suggested, it will not be necessary to feed mineral mixtures. Such feeds contain both protein and mineral and the feeding of large amounts of additional mineral will not only prove of no value but may actually prove harmful. There is, of course, no harm in self-feeding some of the simple mineral mixtures at the weanling stage, but the plan of adding minerals direct to the feed, regardless of other supplements being fed, is a dangerous one.

Grain: Farm grown grains have been found satisfactory for weanling pigs, and where good quality oats, barley and wheat are on hand a suitable feed mixture can be worked out when proper supplemental feeds are provided. A mixture of the grains will give better results than feeding one alone. Young pigs prefer oats to other grains at the weanling stage so this grain may make up a fair proportion of the weaning mixture. Since the small pig cannot handle much bulk, for best results the hulls should be sifted out of the oats or hull-less oats fed until the pigs are approximately one month past weaning (see page 56).

A suitable grain mixture for pigs after weaning may be selected from the following which have been used successfully at the University:

Oats 2 parts Barley 1 part	or	Oats 2 parts Wheat 1 part	or	Oats 3 parts Barley 1 part Wheat 1 part

The proportion of oats, barley and wheat may be altered slightly one way or other without danger. Oats and barley should be ground fairly finely for weanling pigs but wheat should be left in rather a sharp gritty state.

Management After Weaning

In our experience young pigs of the proper bacon type may be hand-fed or self-fed right from weaning time. The system which will be followed may depend upon the factors which were discussed on page 47. A combination system of hand-feeding for the first month after weaning and then self-feeding has been followed very satisfactorily under our

system of management at the University and we are inclined to recommend this method when any large number of pigs are to be raised.

In mixing feed for young pigs, care should be taken to add supplements in the proportions recommended on the basis of experimental work. It is a good plan to check a few mixes by actual weighing of the feeds and then follow these proportions consistently. The addition of supplements greatly in excess of recommendations, sudden changes in mixtures or improper mixing may lead to digestive troubles.

Worm Treatment.—Shortly after weaning, if there is a suspicion that the pigs are suffering from worm infestation, they should be treated as recommended under "Swine Diseases."

Fig. 19.—Spring farrowed pigs make good use of pasture as a supplement to grain during the summer months.

Summer Management

Following the after-weaning period, and probably early in June with the average spring farrowed pig, some form of pasture should be available. Pasture crops and their place in pig raising were discussed on page 42, so we need not elaborate on their value at this time. We would assert again, however, that under average conditions in Alberta they appear to fill a real need in the pork making scheme.

When milk is not being fed, even though good pasture is available, we would suggest the use of a protein-mineral supplement, at least to the extent of about 6% of the grain ration until the pigs reach a weight of 150 pounds. After this weight the necessity for protein is not as marked, and

if a suitable mineral mixture is being fed it may be eliminated.

Oats, barley and wheat may be used in various combinations at this stage, and the following mixtures are suggested:

Oats 1 Barley 1	or	Oats 1 Wheat 1	or	Wheat 1 Oats 2 Barley 1	or	Oats 1 Barley 1 Wheat 1

Water.—If possible, water should be kept in front of the pigs at all times during the summer. The automatic waterer, when attached to a barrel as shown on page 89 makes provision for a steady water supply.

Shade.—If natural shelter is not available in the form of brush, colony houses work in well for summer shade. Shelter should be convenient to where the pigs feed, or they may spend too much time in the sun and suffer from sunburn or sunscald. This is a serious problem, especially with white pigs, and causes a good deal of worry and loss on many farms. Blistered pigs should be well treated with oil of some kind; mineral oil will be found suitable.

Finishing Feeder Pigs

As a general rule it pays to allow pigs all the grain they will eat during the pasture season. The plan of "growing pigs" on a limited feed of grain and "finishing" them with more liberal grain feeding, may result in a slight saving of grain, but this saving is usually offset by the extra labor cost involved in a longer feeding period, and our experiments of recent years indicate that the quality of the carcass is apt to be lowered by the practice of carrying pigs along during a "growing stage" on a limited grain ration. All things considered, it is a wise plan to finish the pigs as they grow, or in other words, to feed liberally from the time the pigs are weaned until they are ready for market.

Some modification in a feeding plan may be necessary, of course, depending on the type of pig being fed. It is important that the finshing process be regulated so that the pigs are properly finished at weights of from 200 to 215 pounds at the farm. Pigs which are under-finished at these weights are very objectionable as they yield flabby, undesirable carcasses which are apt to be placed in the lower grades.

In order to ensure sufficient finish, the percentage of the heavier grains in the feed mixture should be increased after the pigs reach a weight of from 140 to 150 pounds. At this stage pigs should be confined to smaller pens, thus eliminating the exercise which results from feeding in large pasture lots.

If pigs have been self-fed during the growing or "pasture" stage, there is usually some advantage in changing to slop feeding during the finishing period of from 150 to 210 pounds, although where the labor feature suggests the continued use of the self-feeder, very good results will be secured.

Oats, barley, wheat and rye may all be used in working out suitable feed combinations for finishing pigs. Barley is the best finishing feed, and when available it should form a large part of the finishing ration. Wheat has given good results in our finishing tests and can be used with barley or as a substitute for it. Rye is not relished by pigs, but can be utilized when mixed with the other grains. In one of our 1923 experiments a mixture of equal parts of oats, barley and rye gave very good results. Oats are a relatively inefficient finishing feed and should be reduced to a small proportion or eliminated altogether from the finishing mixture.

In order to indicate the rate of gain which may be expected during the finishing period and at the same time to suggest the advantage in economy and avoiding overfinish which results from marketing pigs at around the 200 pound mark as compared with carrying them to heavier weights, the following table showing the results of an experiment conducted during the fall of 1939 is presented. The pigs in this experiment were confined to pens 10′×12′ in size and were fed a grain mixture of 30 parts ground oats, 40 parts ground barley and 30 parts ground wheat. Skim-milk was fed at the rate of one pound to each one pound of grain fed. Ground limestone and salt were added at the rate of ½ pound of each to 100 pounds of the grain mixture.

TABLE XIV.—THE INFLUENCE OF MARKET WEIGHT ON FEED REQUIREMENTS

	LOT I	LOT II
	Marketed at 200 lbs.	Marketed at 225 lbs.
Average initial wt.	139.0 lbs.	136.3 lbs.
Average final wt.	200.0 lbs.	225.7 lbs.
Average daily gain	1.8 lbs.	1.74 lbs.
Feed required for 100 lbs. gain:		
Grain	311.2 lbs.	350.4 lbs.
Skim-milk	311.2 lbs.	350.4 lbs.
Cost of 100 lbs. gain	$2.86	$3.22
Av. depth of fat at shoulder	1.73 in.	2.00 in.
Ave. depth of fat at loin	1.28 in.	1.63 in.

It will be seen that while both groups of pigs made very good gains, the pigs which were fed out until they averaged 225 pounds in weight required a larger amount of feed to put on each extra pound of weight. Gains become more expensive after the 200 pound mark is reached. In addition, the pigs marketed at the heavier weights yielded carcasses showing thicker back fat at shoulder and loin.

When pigs are finished in the dry lot, a supplement may be fed at the rate of 6% to good advantage. Grain mixtures suggested for finishing pigs of 150 pounds in weight, are as follows:

Oats 1 part Barley 3 parts	or	Oats 2 parts Wheat 3 parts	or	Oats 1 part Wheat 1 part Barley 2 parts

Farm Grown Grain Mixtures

In the preceding discussion various grain mixtures have been suggested for pigs of different ages. By way of review it may be stated that, in our opinion, the Alberta farmer who can grow oats and barley, or oats and wheat, or oats, barley and wheat, will have feeds that will make him independent so far as grain mixtures are concerned. As has been pointed out, when milk is lacking some substitute should be provided. With the grains his main concern will lie in working out satisfactory proportions as the age and weight of the pigs advance. In order to bring together some of the suggestions already presented, the following plan is offered:

TABLE XV.—PROPORTION OF FARM GRAINS FOR PIGS OF VARIOUS WEIGHTS

Weight of pig	Lbs. of oats in 100 lbs.	Lbs. barley or wheat in 100 lbs.	Lbs. of supplement in 100 lbs.	Total
Weaning to 60 lbs.....	58	30	12	100 lbs.
60 lbs. to 100 lbs.....	48	42	10	100 lbs.
100 lbs. to 150 lbs.....	38	54	8	100 lbs.
150 lbs. to 200 lbs.....	18	76	6	100 lbs.

The Production of Winter Pigs

As was pointed out previously, one of the major pig marketing problems in Western Canada develops out of the uneven distribution of marketings throughout the year. As a general rule more pigs are marketed during the fall and early winter months than during the spring and early summer months, a condition which disturbs the processing end of the business, as well as marketing connections for the finished product. Successful catering to the British market must depend on a steady volume of supply throughout the various months of the year.

The raising of two litters per year instead of only one, by at least a fair percentage of the sows, would tend to equalize the marketings and in addition would lower the cost of production. The cost of carrying a sow for the year is very little greater when she farrows twice than when she farrows only once.

It must be borne in mind, of course, that when sows farrow during the late fall or winter months, better than average farrowing quarters must be available. Provision will

have to be made for artificial heating, care must be taken to avoid chilling of the young pigs at time of birth and during the suckling period, and strict precautions will have to be taken to guard against the development of anemia in the young pigs (see page 94). Sudden changes in temperature constitute a hazard in connection with winter farrowing in Alberta and all possible steps must be taken to keep this factor under control.

Pigs farrowed during the late fall or early winter months will cost more to produce but on the basis of the usual price prevailing on an open market they will bring a higher price than those farrowed in the spring and marketed during the fall months. The higher production cost may be offset by a higher selling price so that some extra investment in shelter and labor can be justified.

Shelter for Winter Pigs

While pigs farrowed during the fall and winter months require adequate housing during the nursing period, they do not require elaborate shelters during the growing and finishing stages. The winter pig, like the brood sow, must have dry, well bedded quarters, which are free from draughts, but these need not necessarily be expensive. Straw shelters have proven satisfactory on many farms as a temporary measure; and at the University of Alberta colony houses have proven very satisfactory for winter pigs. The gable type house shown in Fig. 20 has been used extensively as a shelter for winter pigs.

The 6×8 colony house will accommodate from 8 to 10 pigs comfortably. In locating the colony houses for the winter they should face south and be crated and banked to the eaves with straw (see Fig. 20). A heavy burlap sack hung over the door breaks the wind and provides suitable protection for the doorway.

If a well built permanent piggery is available this may be used not only for fall and winter farrowing, but for housing the pigs during the growing and finishing stages. Such buildings should be insulated and well ventilated to prevent the accumulation of frost on the walls and ceilings during the extremely cold spells. A small stove in such a building will work wonders in preventing frost accumulation and dampness.

During the winter of 1936-37 an experiment was conducted to compare the feeding of fall pigs sheltered in colony houses (as shown in Fig. 20) with others sheltered in the permanent piggery with artificial heat provided. The two groups of pigs were similar in breeding and were fed the

same ration with the exception that the pigs which were confined in the piggery were fed cod liver oil at the rate of 1 pound to each 100 pounds of grain and supplement until they weighed 100 pounds.

The results of the experiment are shown in the following table:

TABLE XVI.—METHOD OF HOUSING FALL PIGS

	LOT I Piggery, Heated with Stove	LOT II Colony House
No. of pigs in lot	5	5
No. of days on Experiment	112	128
Av. Initial weight	43.7	41.9
Av. Final weight	212.0	207.0
Av. Daily Gain	1.50	1.29
Feed required for 100 lbs. Gain		
Grain	327.01	352.78
Supplement	43.44	47.87
Total	370.45	400.65
Cost of 100 lbs. Gain	$5.93	$6.42
Profit per pig over feed cost ($8.00 per cwt.)	$4.45	$3.45

It is to be noted that the pigs fed in the piggery where some heat was provided made their gains more quickly and at a lower cost for feed. The piggery which was heated with a small stove accommodates approximately 70 pigs. Based on the number of pigs which the building accommodates, rather than on the 5 pigs actually on test, the saving in feed amounted to approximately $50.00. It required 3 tons of coal at $4.00 per ton to heat the building, so that the use of the stove was amply justified on the basis of feed saved. At the same time, the pigs fed in the colony houses made very satisfactory and economical gains and returned a fair profit over feed cost considering 1936-37 grain prices. It would seem that while the permanent piggery may have some ad-

Fig. 20.—Gable type colony houses banked to the eaves with straw and with a heavy sack hung over the doorway, provides good shelter for fall pigs.

vantage over the colony house as a shelter for fall pigs, the colony house, with outdoor quarters, will render good service.

Suitable Rations for Winter Pigs

In planning feed mixtures for winter pigs it is well to keep the following general principles in mind: (1) The pig fed during the winter months cannot make use of pasture or green-feed in the same sense as the pig farrowed during the spring or summer months and, therefore, cannot help to balance his own rations; (2) Gains should be such that most of the pigs may be marketed at between six and seven months of age.

Unless the ration of the winter pigs is well balanced gains are likely to be slow and comparatively expensive. Pigs badly fed during the winter months can "pile up a heavy feed bill" and prove a liability rather than as asset.

Grain Mixtures

With regard to grain mixtures for winter pigs, what has been said already concerning the use of farm grown grains and the most suitable proportioning of these grains will apply equally well here.

Supplementary Feeds

When skim-milk or buttermilk are to be had, success in winter pig raising is almost assured. When such feeds are not available, we are quite sure from our experimental findings that some substitute must be provided if satisfactory results are to be secured. The spring pig handled on the outdoor plan may get pasture but the winter pig is deprived of this source of additional protein. Here again, supplements in the proportions mentioned on page 64 will prove of great value when added to the grains. They will insure quick gains and each pound of the supplement will save sufficient grain to more than justify the purchase price.

Mineral Matter for Winter Pigs

The pig grown during the summer months may supplement the grain fed by using pasture, or even by "rooting" up the pasture lot. The winter raised pig is for the most part grown under conditions which deprive him of the use of forage and contact with the soil. For this reason the question of a mineral supply is of even greater importance in the case of the fall and winter farrowed pig than with the spring pig. Mineral supplements work hand in hand with protein supplements in rounding out complete rations for winter fed pigs.

Fig. 21.—Litter mate fall pigs at six months of age. The pig on the left weighed 230 lbs. and the pig on the right weighed 80 lbs. Providing sufficient mineral in the feed made the difference.

Fish Oils

Pigs which are farrowed during the fall and winter months, if closely penned following weaning, will be benefited by the feeding of some form of fish oil until they reach a weight of around 100 pounds. The oil will assist in preventing crippling and our observations with experimental pigs led to the conclusion that this supplement assists in guarding against influenza conditions (see page 45). When commercial supplements which contain fish oil are being fed, it will not be necessary to feed additional oil.

Watering Winter Pigs

When skim-milk or buttermilk is not abundant, and when the grain is fed dry from self-feeders, winter pigs will use a considerable volume of water. If possible it should be supplied three times daily and the trough kept as free as possible from freezing. It is doubtful if the expense of warming the water is justified. In an experiment conducted at the University of Alberta during the winter of 1923-24, the warming of water did not effect any improvement. Under certain conditions, however, it would appear to be advisable to remove the chill from the water for very young pigs, particularly when the weather is extremely cold.

Winter Pigs Pay Their Way

During the period from 1922 to 1944 approximately 4,000 pigs have been farrowed during the fall months, and grown and finished during the winter months, at the University of Alberta. The majority of these pigs have been used in experiments regarding the feeding and management of pigs finished during the winter months, and in addition the econ-

omics of the business have been carefully checked. Over this period, pigs grown out during the winter and marketed during the spring months have returned a satisfactory profit over and above feed costs, even after grain prices were charged at 20% higher than elevator prices. The margin between cost of production and selling price has varied year by year depending upon the relationship between hog and grain prices, but over a period of years the second litter has proven profitable.

It has been demonstrated clearly in our winter experiments, however, that the feeding of protein and mineral supplements is a necessity if economical gains are to be made. The larger number of inquiries which we receive each year during the late winter months, regarding slow gains and "crippling" among winter pigs, indicate that more attention must be paid to better balanced rations.

APPENDIX A.

CURING PORK ON THE FARM

There is no class of consumer in Alberta who has a better opportunity to consume high class meat products than the farmer. At most seasons of the year he is independent of the meat purveyor and may select and slaughter on the farm animals of the proper quality and at the weight and degree of finish to suit the individual family requirements. While it is true that the best is not always utilized for home consumption, the fact remains that the farmer has it within his power to produce and process for use on the farm as fine meats as can be purchased in the highest class meat shops.

On the majority of farms pork is a staple article on the menu during a considerable part of the year. There would appear to be no reason why pork should be purchased for use on the farm, and still this practice is followed on many farms. In a time of financial stress, the use of home produced pork is a means of reducing the cost of living. The selling of live hogs and the purchasing of cured hams and bacon on the farm does not look like sound economics.

The slaughtering of live hogs and the curing of pork are not involved processes, and when a few simple principles are carefully followed, a good dressed carcass, and finally an attractive cured product, is assured. In order that those who have not previously cured pork on the farm may have something to guide them in their operations, the following passages are quoted from a well-known book, "Farm Meats,"

whose author is Professor M. D. Helser, of the Iowa State College. The "cures" which are suggested by Professor Helser have been extensively used, and we can vouch as to their reliability when his instructions are carefully followed:

Vessels for Curing.—"Oak barrels or large stone jars are the most satisfactory vessels for curing. The stone jars are somewhat expensive and apt to be broken, but are quite easily kept clean. If meat spoils in them, they can be easily cleaned and used again. A clean container is absolutely essential for successful meat curing. Vessels should always be thoroughly scalded out before being used. Do not take any chances with the curing vessel, as a great deal of meat is spoiled in this way every year."

Methods of Curing Meat.—"There are many methods of curing meat, most of which are simply a variation of two principal methods, the brine cure and the dry salt cure.

Curing Agents.—"Common salt is the basis of all meat curing. It has a preserving effect and has a tendency to make the tissues hard and dry by driving out the moisture and meat juices. Sugar is sometimes used to give a sweet flavor, and it aids in counteracting the action of the salt by keeping the muscles soft. Brown or white sugar may be used; the old fashioned brown sugar usually gives a little better flavor. Syrup may be used in place of sugar. Saltpeter (Potassium Nitrate) may be added to give a red color, and it also has some preserving effect. Sodium Nitrate (Chili Saltpeter) may be used in place of the Potassium Nitrate. Use about one-fifth less Sodium Nitrate than Potassium Nitrate. Without the use of Saltpeter the meat will be gray in color when it comes out of the cure. The red color is made by the formation of nitrous acid, which acts on the hemoglobin, producing a bright red derivative (hemorrhoidon). Baking soda is quite often added to the brine cure to keep it from souring. Other ingredients are sometimes added for flavoring. Salt, sugar and saltpeter make the best combination for curing meat. Common salt, however, is the only absolutely necessary ingredient. An excellent product can be made with salt alone.

"In all cures be absolutely sure that the meat has all of the animal heat out of it and that it has not been frozen. A great deal of meat is lost every year by allowing the meat to freeze before curing or during the curing process."

Place for Curing.—"A cool, well ventilated cellar is a very desirable place for both brine and dry curing. The smoke house is quite often used for curing as well as smoking. Cold storage rooms make the best place for curing meat; here a

uniform temperature may be maintained, and there will be no doubt about the meat spoiling in the centre before the salt works in and no danger of the meat freezing.

"Either the brine cure or the dry cure will produce a first-class product. The beginner usually obtains a more uniform cure with the brine method. This method is not so satisfactory in warm weather or when the temperature ranges above 40°F. The brine will sour and the meat will spoil. Splendid results may be obtained with the dry cure if you are careful to get the cure rubbed on evenly".

The Brine Cure.—"If sugar is added, this cure is known as the 'sugar cure' or 'sweet pickle'.

"For each 100 pounds of meat use:

12 lbs. salt	3 lbs. sugar
2 ozs. saltpeter	6 gals. water

Thoroughly mix the salt, pulverized saltpeter, and sugar (either brown or white, brown preferred), and rub some of the mixture into the hams, shoulders, and bacon. Pack all meat, ham, shoulders, bacon, and jowls in the same vessel. Put the skin side down on all but the top layer; there put skin side up. Weight this down with hard burned tile or brick or some hardwood. Never use pine wood or limestone. Be sure to weight this down before pouring the brine in, because some of the meat will float.

"Boil the six gallons of water to make sure that it is absolutely pure. While the water is still warm, dissolve the ingredients left after rubbing the meat. After the brine has cooled, pour it over the meat. Be sure that all the meat is completely covered with brine. Set aside in a cool, well-ventilated place to cure about three days per pound for each pound of ham and shoulder. Two days per pound is sufficient for the bacon. Hams and shoulders weighing twenty pounds or more should be cured three days per pound per piece. Pieces weighing over twenty pounds should be skinned or trimmed down to at least twenty pounds in order to obtain a satisfactory cure. Bacon weighing around ten pounds will cure in about two or three weeks; the jowls will cure in one week. In order to insure a uniform cure, the meat should be repacked in seven days, leaving out the small pieces such as the jowls. After the meat has been weighted down, pour the brine over the meat, unless the brine is sour and ropy. Sour brine should be thoroughly boiled and some soda added before using it again. It is safer to make new brine, scald the barrel thoroughly, and wash the meat thoroughly. In case a new brine is made, do not make it quite as strong as the first, and do not leave the meat in quite as long as would have been done with the first brine. The brine

should be carefully watched for souring and ropiness. The meat should be re-packed again on the twenty-first day of the cure, and the bacon removed. When the meat comes out of the cure, wash thoroughly in hot water to get the grease off to the rind, then wash in cold water and hang in smoke house to drip about twenty-four hours before smoking.

The Dry Cure.—"Here again salt is the basis, but any of the other ingredients may be used if a sweet flavor and a red color is desired.

For every 100 lbs. of meat use:

8 lbs. of salt
3 ozs. saltpeter
3 lbs. sugar (brown preferred)

Mix the ingredients thoroughly and rub half of the mixture on the meat. If the weather is above 45°F. it is advisable to push some of the salt up along the shank bone and some into the hip joint where the ham has been cut from the side. This will get some salt to the inside of the ham before it has a chance to spoil. Many people think that as soon as the outside of the ham is salted, it is safe, but the inside must keep until the salt has had a chance to work in. In seven days rub the other half of the mixture on the meat. The small pieces may be left out this time. Repack again on the twenty-first day of the cure and remove bacon. There will be some liquid in the bottom of the vessel. The meat from the top of the pack should be placed on the bottom and vice versa, this time to get a uniform cure. Three days per pound per piece will be sufficient for the hams and shoulders. Wash the meat with cold water and hang in the smoke house to drip for twenty-four hours before smoking. Be sure to hang the pieces so that they do not touch each other.

"If you expect to use the meat from either of the above cures before the weather gets warm, or within 30 or 40 days after curing it may be taken out of the cure in a little less than three days per pound per piece. If you expect the meat to keep during the hot summer months, three days per pound per piece will not be too much."

APPENDIX B.

EQUIPMENT FOR SWINE RAISING

By

J. MACGREGOR SMITH, Professor of Agricultural Engineering.

The section of this publication which follows is included to draw attention to plans of certain pieces of swine raising equipment. It also covers plans of hog houses.

Danish Type Piggeries

Since the first edition of this bulletin was published there has been a good deal of interest in the Danish type of piggery which has a dunging alley. The Alberta Department of Agriculture, co-operating with the University Departments of Animal Husbandry and Agricultural Engineering, has prepared plans (pages 76-79) from a piggery built at Spruce Grove. These plans are available on separate sheets, but for convenience have been reduced in size to fit this publication. Copies of these plans on a larger scale may be obtained upon request, from the Extension Service, Department of Agriculture, Edmonton, or the Department of Animal Science, University of Alberta, Edmonton.

The importance of ventilation has been emphasized and the main points to be carefully considered will be found below.

The idea in presenting these plans is not to suggest that each one must necessarily be followed exactly as illustrated, although they are drawn from models which have proven to be satisfactory, but should be used more as a guide to the general type of construction. They may be modified to meet the needs of the individual farm, depending upon the scale of operations. Most of the plans submitted are drawn from equipment which is in common use on the University Farm.

Ventilation.

The problems of ventilation are easily taken care of in the first buildings, which are generally erected on the farm. Log stables, straw sheds and sod barns are usually constructed so that the air circulates quite freely through them. However, when more permanent buildings are erected some provision must be made for proper ventilation if they are to provide comfortable quarters for livestock. A well constructed building with no provision for admitting fresh air in small quantities and for taking off the warm foul air in large quantities will result in a damp stable. The walls will be wet or covered with frost; harness and fork handles as well as the stock will be wet.

It is hardly necessary to point out that the climate of Western Canada creates some difficult problems in ventilation. The system shown in the plans is the single out-take King system. Professor L. G. Hempel of Macdonald College did some research work on this problem and found that the single outlet was quite adequate. On receipt of his bulletin about six years ago the writer discussed the problem of ventilating a new piggery being erected by J. H. McLaughlin at Spruce Grove, and it was decided to install the system. Careful records were kept on inside and outside temperatures for two winters (1935-36 and 1936-37). The results were very satisfactory. The barn was dry inside and the pigs were comfortable. The barn was planned on the Danish system and in sub-zero weather a stove was used. It is recommended that some artificial heat be provided in extremely cold weather because pigs do not create much heat and they are more susceptible to ailments resulting from draughts and dampness than are other classes of livestock.

It may be well at this time to point out that **unless the barn is to be well built, with the walls (6″ studding) insulated and with all windows provided with storm sash and doors with storm doors,** there is little use spending any money installing a ventilation system.

Dry, coarse planer shavings make good insulating material. Hydrated lime may be dry mixed with them to prevent rodents working. Two pounds of lime to every hundred pounds of shavings. There are also other insulating materials sold commercially.

The ingoing air enters the barn as shown in the side elevation and wall section views. A partition is placed between two studs, the inside part being insulated. It will be seen that the fresh air is directed upwards and through a small hinged door, which will allow a little air to enter even when in the closed position. In connection with the construction of inlet flues it is to be noted that the space between two studs is divided as shown in "Wall section through air intake." It is insulated on the inside. It is important that the cover on the opening at the ceiling be made so that there is, even when it is in the closed position, a space of about an inch.

The outlet flue rises from the floor and if one does not feel that it has to come out on the ridge of the roof it is recommended that it be carried **straight up through the roof.** In either case it must rise above the ridge. In a piggery built by P. J. Rock of Morrin the ventilator was installed quite near the end of the barn (on the inside) away from the stove, and the system worked very satisfactory. The outlet flue

must be built so that there is no leakage of air. There must be two ply of lumber with paper between, but insulated board is recommended. The flue rests on the ground and if possible should be vertical from the bottom to the top. Construction is simplified and it will operate to better advantage.

The "detail of the ventilator" shows one type of construction where panels of matched lumber are constructed on the ground and after one is erected, plumbed and braced, the others are put in place. (Horizontal joints should be staggered.) Cross cleats and corner strips hold them together. Insulating board can then be fastened on the corner boards, thus leaving an air space. In another type of construction corner posts are set up, plumbed and braced, and the sides enclosed with horizontal boarding, then paper and V-joint lumber vertically. The door at the floor level is provided with a counterweight which can be easily adjusted. The amount that this door is open controls the amount of air entering the barn. No system can work efficiently without careful attention by the man in charge of the building. The top of the outlet flue should have no louver boards to obstruct the outgoing air. A heat door in the flue at the ceiling will be useful in mild weather.

It may seem to many that there are too many details to be considered, but it was pointed out in the beginning there is no possibility of reasonable success unless the building is carefully constructed. A single ply lumber building, unlined and with the ceiling unlined cannot be ventilated, and there is little use wasting time in trying to find a way to do it. In a moderate climate, windows may swing in from the bottom and no difficulty is encountered in ventilating the building.

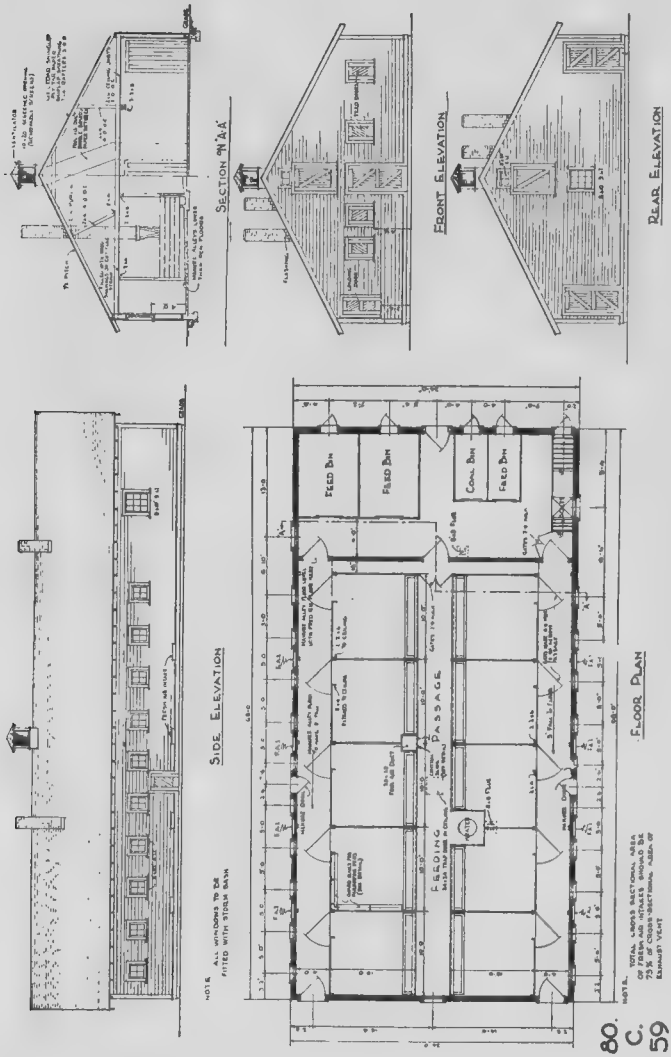


Fig. 22.—Plan for ten pen permanent piggery based on the Danish arrangement with litter alley separate from pens.

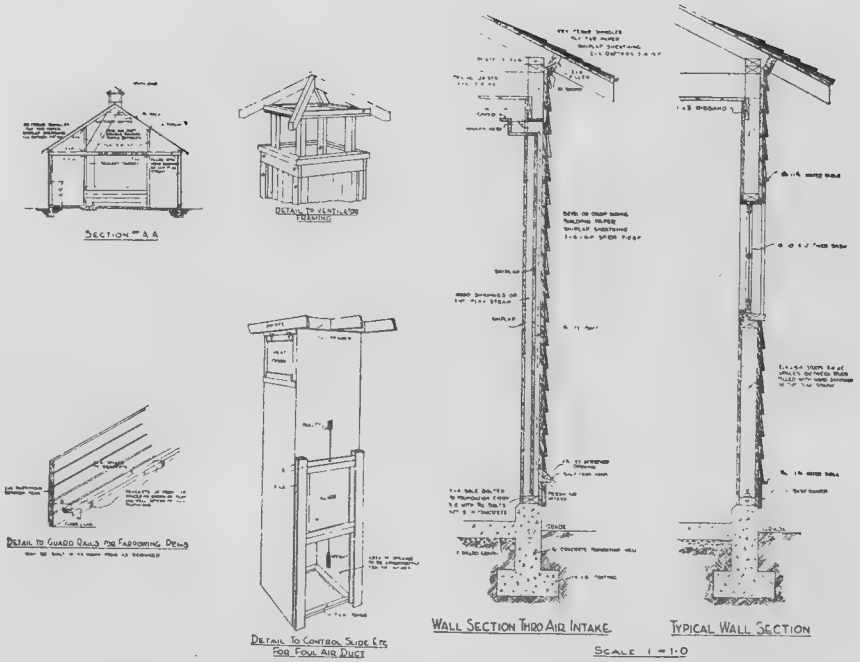
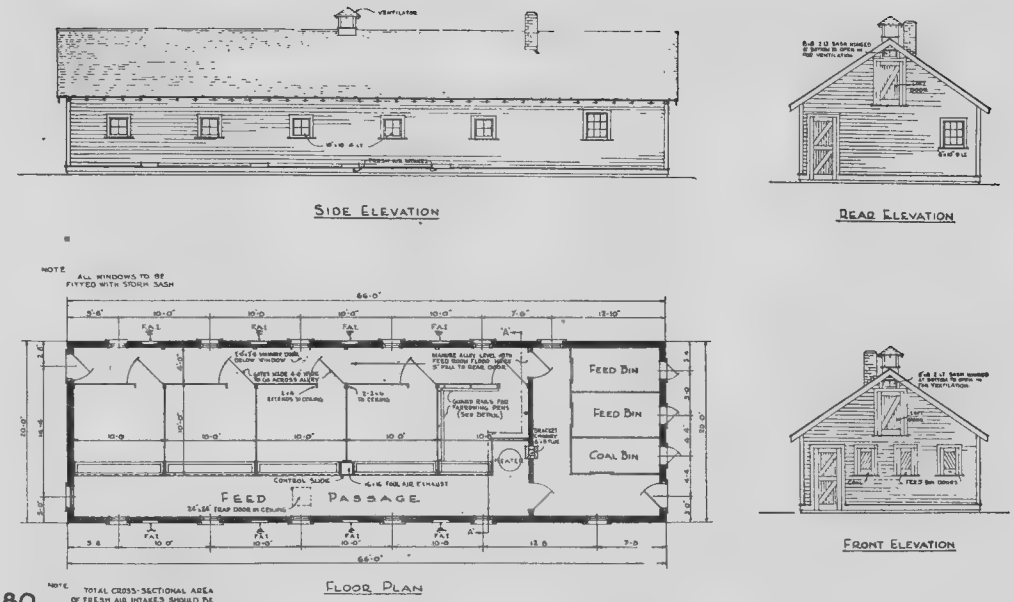

SECTION A A
DETAIL TO VENTILATOR FRAMING
DETAIL TO GUARD RAILS FOR FARROWING PENS
DETAIL TO CONTROL SLIDE ETC FOR FOUL AIR DUCT
WALL SECTION THRO AIR INTAKE
TYPICAL WALL SECTION
SCALE 1 = 1·0

Fig. 23.—Details of wall construction showing fresh air inlets together with detail of ventilator framing. This system of ventilation to be used in buildings shown on Figs. 22, 24 and 25.



80.
C.
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Fig. 24.—Plan for five pen permanent piggery with Danish floor arrangement.

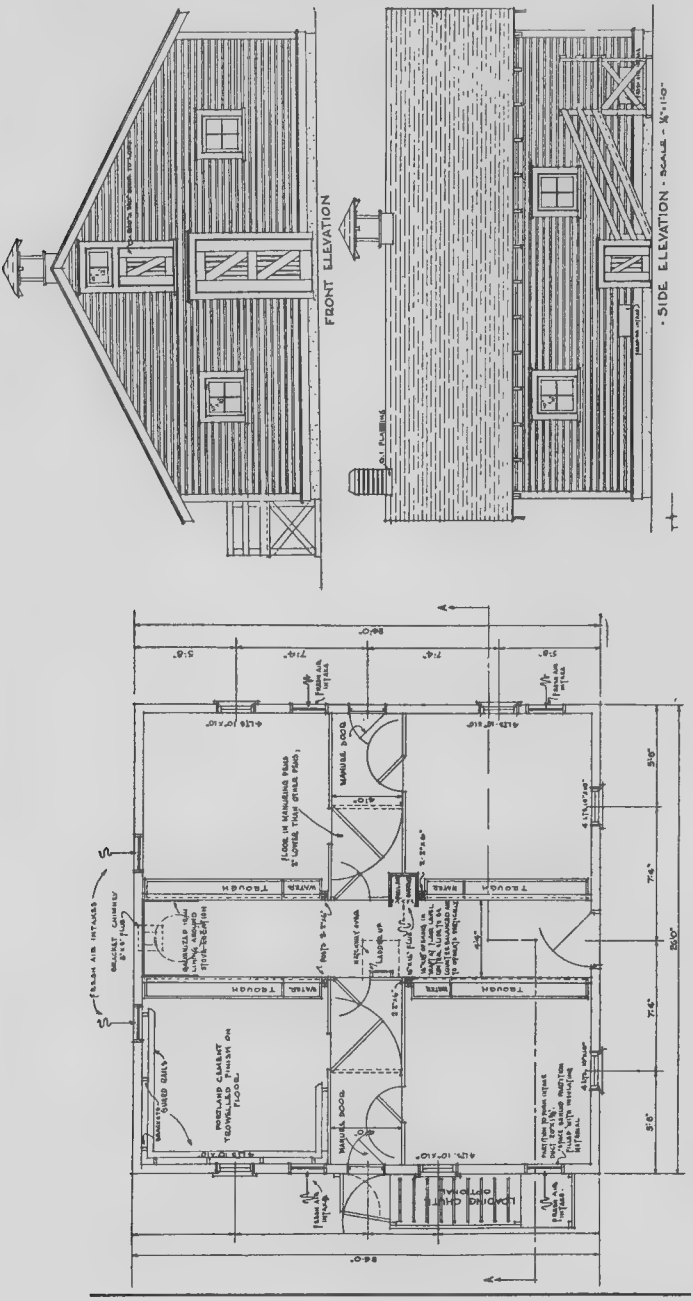

Fig. 25.—Plan for four pen farrowing house or general piggery.

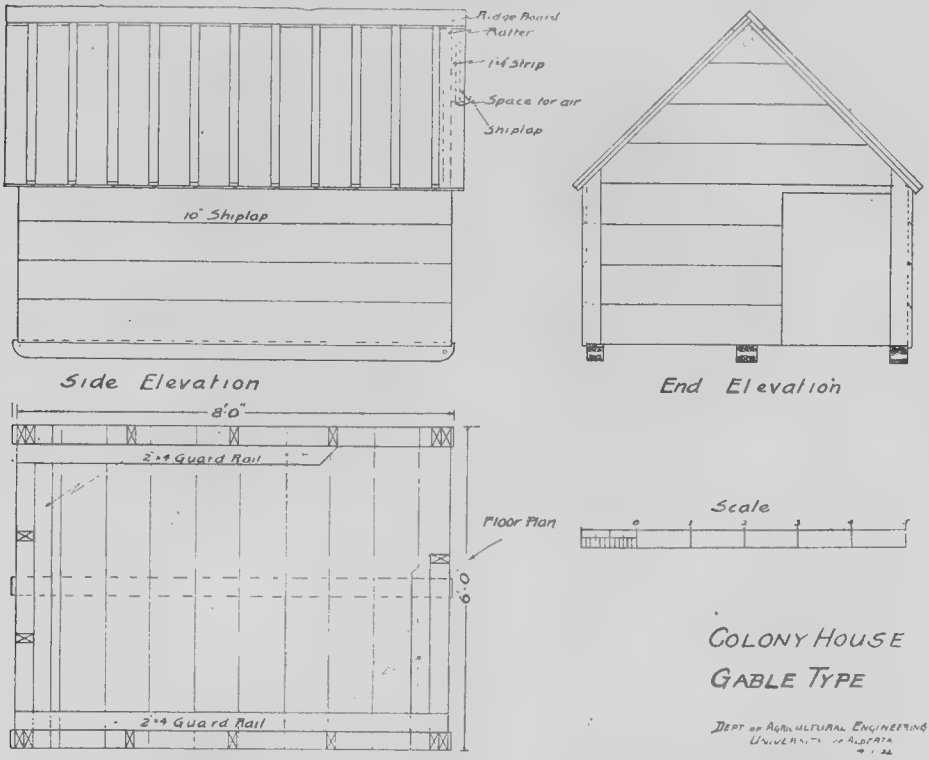

Fig. 26.—Plans for construction of 6′×8′ Gable Type Colony House.

Gable Type Colony House.

Several types of colony houses have been used on the University Farm, but the gable type house shown in Fig. 26 has been found the most satisfactory. This 6′×8′ house can be used practically all the year round. Sows and litters can be accommodated in such houses in the spring after having been removed from the farrowing house, pigs on pasture may be sheltered in them, and when banked with straw they will accommodate fall pigs and brood sows during the winter months. Being portable, they may be moved to fresh ground from time to time and thus assist in avoiding parasitic infestation.

The house shown in Fig. 26 is mounted on 3-4″×4″ runners on which the floor is laid, and the framing being erected as shown in the illustration of framing details. Very little further explanation is needed. The second illustration shows the side and end elevation as well as the plan.

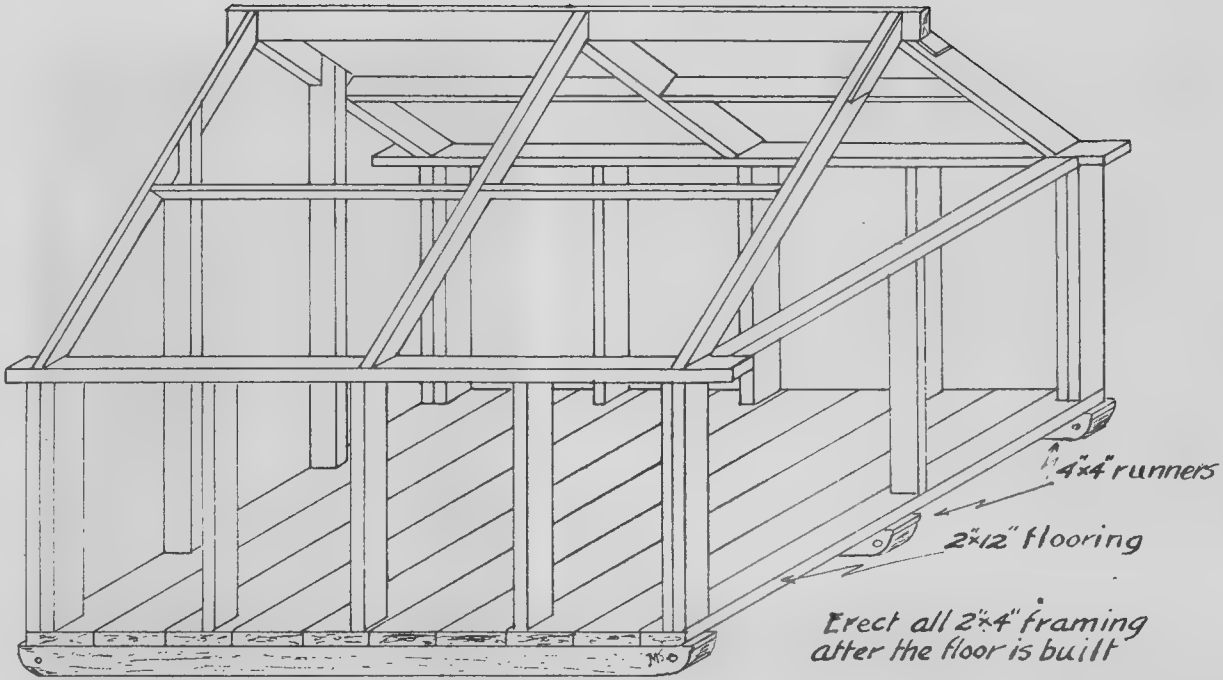

Fig. 27.—Framing details for 6′×8′ Gable Type Colony House.

Pig Brooder House

In an effort to assist swine raisers who wish to have sows farrow during the winter months and who desire special farrowing quarters, a pig brooder house has been designed by the Dominion Department of Agriculture officials working in co-operation with practical Alberta pig producers.

This brooder house, which has been used with satisfaction by a large number of farmers, is a six-sided building with six farrowing pens which taper to the centre. A chick brooder stove is located at the centre and provision is made for the small pigs to have access to the heat from this stove and at the same time secure protection from trampling or damage in other ways.

Information regarding the construction of this building may be secured through the Dominion and Provincial Departments of Agriculture.

Electric Pig Brooder

On farms where electric power is available very good results may be secured from the use of an electric pig brooder. This type of brooder consists of a triangular shaped box which may be arranged in the corner of the farrowing pen. Heat is provided by an electric light bulb suspended through an opening in the top of the box, which is covered by an ordinary metal or porcelain shade.

Fig. 28.—Electric pig brooder. Heat is provided by an ordinary electric light bulb.

Information regarding measurements and construction of this type of brooder will be sent to those who may be interested.

Self-Feeder for Grain.

The self-feeder shown in Fig. 29 is a one-way type, that is, the pigs feed from one side only. This feeder is large enough to accommodate from ten to twelve pigs. It might be extended to accommodate a larger number of pigs, and modified so that pigs could feed from both sides.

Attention is drawn to the depth of the feed trough and to the spacing strips across the trough. These strips serve to prevent the pigs from rooting the grain out of the trough. A feeder built according to the plan suggested, and when mounted on a platform, will function with a minimum wastage of grain.

In order to make the details of construction clear, a separate cut has been made showing the framing (see Fig. 30).

The galvanized steel sheet which is shown in the sectional view is very important, and makes a good smooth surface for the grain. The construction of the roof and hinges is very important in order to prevent any leakage of water. It is cheap and easily built; a strip of prepared roofing is nailed on to the shiplap and held by strips of lath. Over the hinge another piece of prepared roofing is nailed, making a watertight joint.

Self-Feeder for Minerals.

When mineral mixtures are being fed it is advisable that they be fed from a self-feeder such as shown in Fig. 31. This feeder is shown in actual use in the illustration on page 90.

This feeder is smaller than the one for grain, and it is open on both sides. The adjustable sides do not need to be removed very often, and for that reason no special fastener is required. The two nails will hold them in place quite readily. The lid can be made in the same way as the one shown in the self-feeder, with an extra piece of roofing material over the hinges.

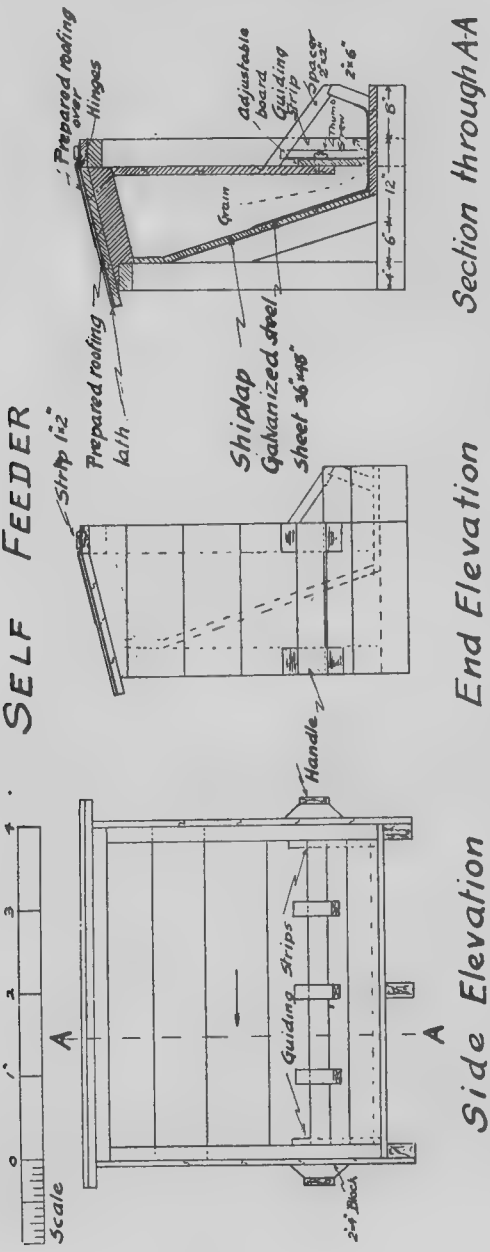

Fig. 29.—Plan for one-way self-feeder for grain.

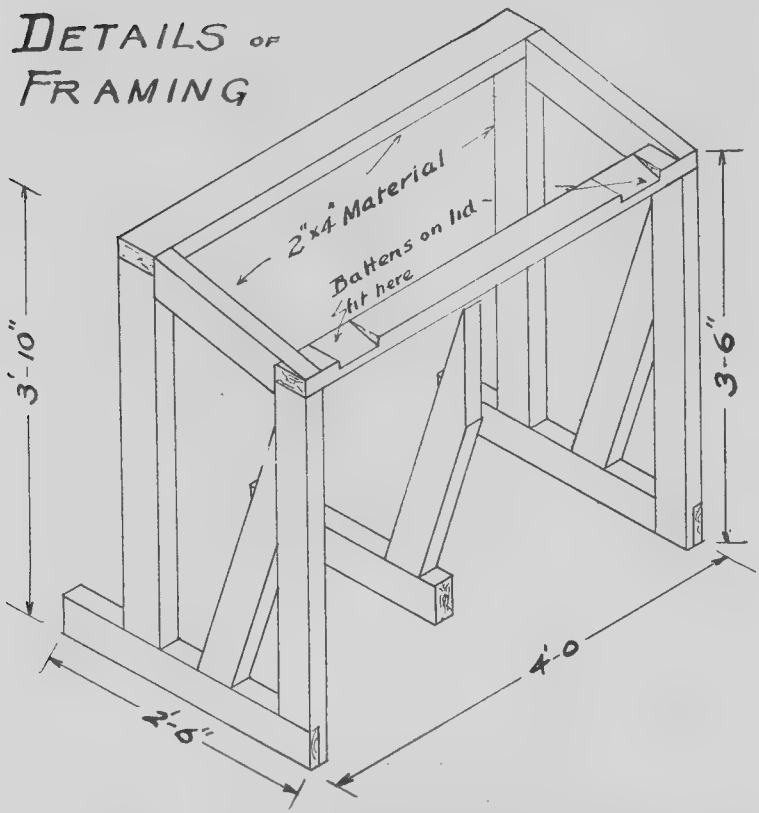

Fig. 30.—Details of framing of self-feeder for grain.

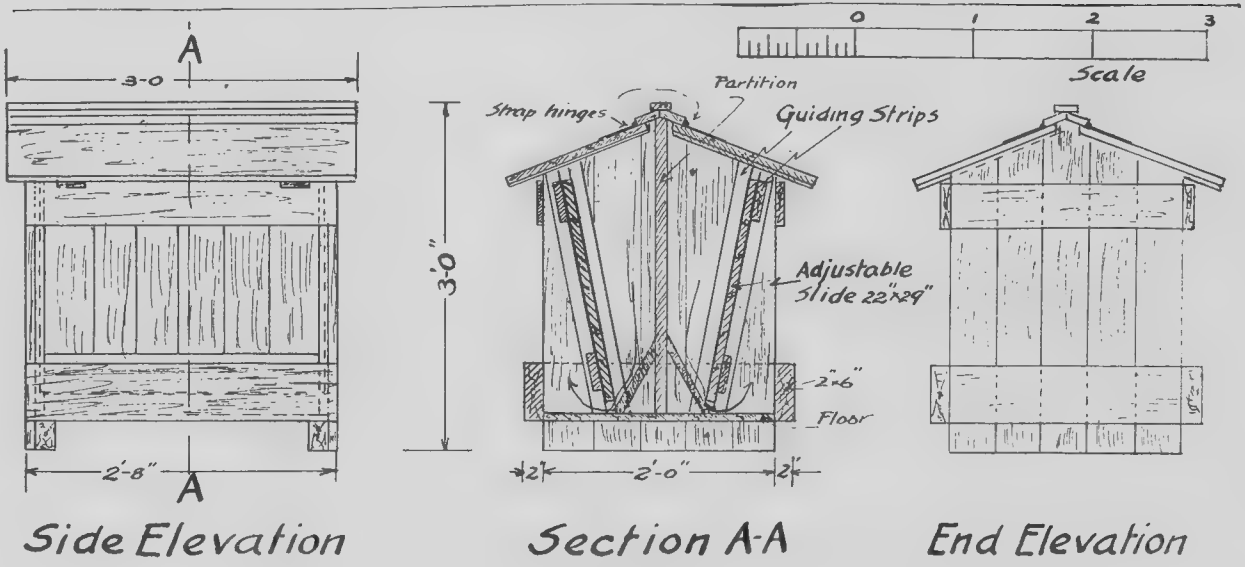

Fig. 31.—Plan for construction of small self-feeder for minerals for pigs.

Fig. 32.—Plan showing construction of hog shipping crate.

Hog Shipping Crate.

Breeders of pure-bred pigs will have occasion to ship pigs to purchasers. Pigs must always be crated, and shipping companies will not accept pigs for shipment unless the crate is well made.

The crate shown in Fig. 32 can be made to suit the size of the pig. The illustration shows a crate that is strongly constructed and will stand shipping well. It will be noticed that most of the boards are 1″×4″ material, with the exception of the two lower boards on the sides and the door and top. The runners are made of 2″×2″.

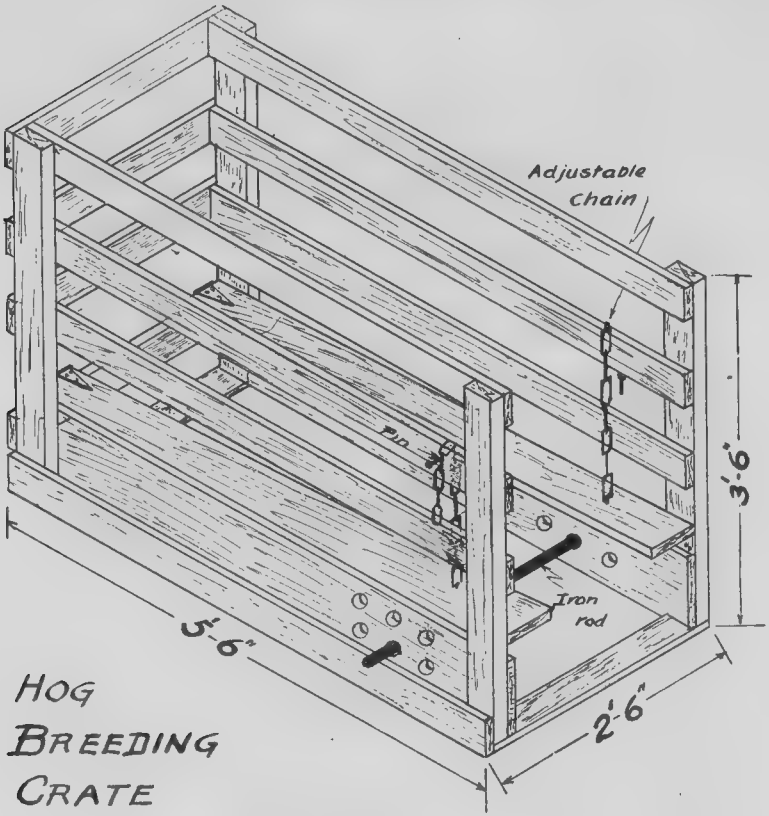

Fig. 33.—Breeding Crate.

Hog Breeding Crate.

It occasionally happens that a small sow must be mated to a large, mature boar. If the sow is not sufficiently developed to support the weight of the boar, the breeding crate shown in Fig. 34 may be utilized to good advantage.

The dimensions of the crate are: Length 5′6″, width 2′ and height 3′6″. The uprights at the corner are made of 2″×4″ material, and the sides may be made of 4″ strips of inch lumber, with a 10″ board at the bottom of each side. The supports for the feet of the boar are hinged at the front end of the crate and may be raised or lowered by means of the adjustable chain indicated in the illustration. An iron rod which slips through holes in the bottom side boards should come just above the hocks of the sow so that she is prevented from backing out of the crate.

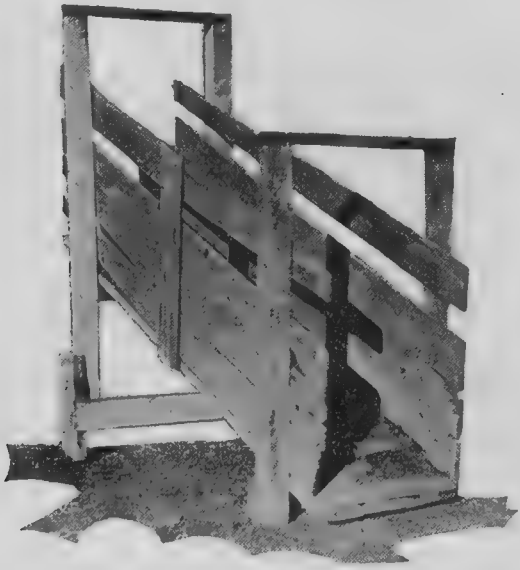

Fig. 34.—Portable Loading Chute. This chute might be improved by equipping in front with a pair of small wheels. When connected with a narrow runway this piece of equipment makes the job of loading pigs an easy one.

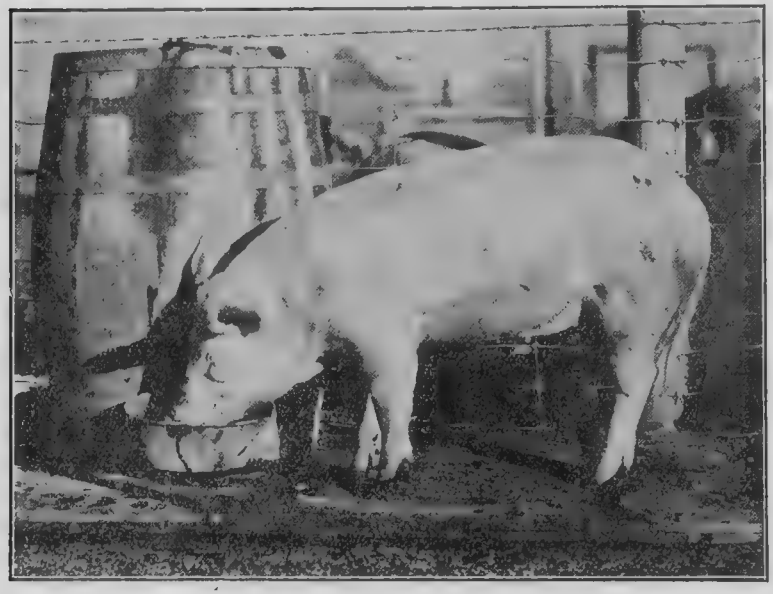

Fig. 35.—An automatic waterer attached to heavy barrel provides a means of keeping water in front of the pigs during the summer months.

Fig. 36.—The water tank with automatic waterers attached as shown above, may be used to keep water in front of a very large number of pigs during the summer months. At the University Farm a herd of thirty sows drink from this tank.

Fig. 37.—The self-feeder for minerals planned in Fig. 31 is shown in actual use in the illustration above.

Oat Hull Sifter.

In connection with sifting the hulls from oat chop in the preparation of feed mixtures for young pigs, considerable time may be saved if a suitable piece of equipment is available for doing the job. A simple home-made separator for removing hulls from oat chop was designed by Mr. P. Wyllie, formerly Acting Sheep and Swine Promoter, Livestock Branch, Department of Agriculture, Edmonton, and plans showing the details of construction of the machine may be obtained from the Extension Service, Alberta Department of Agriculture, Edmonton.

Fig. 38.—A home-made separator for removing hulls from oat chop. (Courtesy Alberta Department of Agriculture.)

Hog Weighing Equipment.

The use of some type of scale for weighing hogs as they approach a marketable stage, is almost a necessity if they are to reach market at the correct weights. This matter has been given careful consideration by both Federal and Provincial Governments and types of equipment for weighing hogs on the farm have been designed. Plans for a home-made hog weigher may be obtained from the Extension Service, Alberta Department of Agriculture, Edmonton.

A simple, inexpensive scale specially designed for weighing hogs on the farm, may be purchased through the Dominion Department of Agriculture. Information regarding this scale may be obtained from the District Fieldman, Livestock Production Services, Dominion Department of Agriculture, Edmonton.

APPENDIX C.

DISEASES OF SWINE

By
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The following brief description of a number of diseases, which we consider the most important amongst swine—or the most commonly met with in that class of animal, is not intended to replace the services of a Veterinarian, but rather to meet a practical need for those that are raising swine, and where proper veterinary services are unattainable. We have endeavored to avoid the use of technical terms insofar as possible. If the advice of a qualified person is available, and an owner is unable to diagnose the condition, naturally he should call in a Veterinarian.

Prevention is the most important factor in controlling swine diseases. The isolation of sick animals at the first indication of an abnormal condition may save the lives of a considerable number of animals, as well as eliminate a lot of expense to the swine owner. Many ailments, especially in swine, can be traced directly to the insanitary conditions of the yards and pens. We find that little or no attention is paid to the regular and thorough disinfection of buildings housing swine, or to the orderly changes of pasture during the summer months.

Improper feeding methods, and the quality of feed that is being fed, have a great bearing on the health of young pigs, especially at weaning age.

The presence of intestinal parasites in swine is becoming more prevalent each year, and requires continuous care on the part of the swine owner in order to keep them in check.

Suitable feeding platforms, that can be washed and disinfected at frequent intervals, are desirable. Swine cannot be raised satisfactorily if kept in an insanitary condition, and dirty, poorly lighted, and improperly ventilated swine houses are ideal breeding places for parasites and bacteria. Sunlight is necessary for the health and development of growing animals, as well as being an excellent disinfectant. For these reasons, therefore, hog houses should contain a sufficient number of windows to admit plenty of sunlight.

The frequent cleaning of hog lots and pens are necessary in order to maintain swine in a healthy condition. Filth should not be allowed to accumulate for it becomes a breeding ground for organisms causing infection. The floors should be scraped and the walls cleaned thoroughly, then washed with a reliable disinfectant at least twice a year.

Low spots that hold water in pastures or hog wallows are frequently the source of many swine diseases; for this reason swine should not be allowed access to them.

History Important in Swine Diseases

The history of abnormal diseases of swine is of great value in making a diagnosis. It is not only of importance in detecting the differences in infectious diseases, but it is also helpful in determining whether the trouble is due, directly to mistakes in feeding, poor management, improper medication, or many other causes. In all cases of sick swine the owner should, in trying to determine the cause of the trouble, go carefully over the symptoms of the animals affected, the quality and kind of feed given, the age and number of the animals showing evidence of disease, as well as the length of time the symptoms have existed on the premises. Post-mortem examinations are, of course, helpful in determining the cause of disease, but these should be made by a qualified person, otherwise a mistaken diagnosis may be made.

Attitude of Sick Swine

We believe the general attitude of sick swine is important in the aid of diagnosing swine ailments. As a rule staggering and uncertain gait signifies general weakness and may be associated with an infectious disease that has existed for some time, or it may be connected with some debilitated condition. Respiratory diseases, such as pneumonia, are usually indicated by the animal reclining a great deal, and when disturbed a marked cough is noticed.

Digestive disturbances are indications, as a rule, of improper diet, or parasitical infestation. Lameness and disturbances in locomotion may be due to mineral deficiency, injury, rheumatism, bacterial infection or parasiticism. It should be borne in mind that respiratory diseases are probably the most common of all swine troubles. The reason for this may be due to the fact that this class of animal has not a large lung capacity. Dust and dampness are frequent causes of troubles of the respiratory organs. In addition the lung is the natural habitant of the larvae of the round worm, and for this reason parasitical pneumonia is of common occurrence.

Iodine Deficiency

There are certain districts in Alberta where the soil and water show a lack of iodine. Where there is a deficiency of this mineral, hairlessness and enlargement of the thyroid gland in newly born pigs will likely be noticed. Sows deficient in iodine may produce still born litters, or those that die immediately or shortly after birth. Fortunately the con-

dition can be prevented by giving the sow iodine solutions during the gestation period. We believe iodine deficiency is so general that the addition of the drug to the ration should be a routine practice for all breeding sows. The amount of iodine given may have to be varied according to districts, or even on certain farms. In some instances one grain per day of potassium iodide for each sow may be sufficient to meet requirements—in other cases two grains each day might be desirable. The most convenient method for giving potassium iodide is in solution; the proper mixture would be one or two ounces (as desired) dissolved in one gallon of water, and the dose be one tablespoonful in the feed once a day.

Anaemia in Young Pigs

Anaemia is responsible for the loss of a large number of young pigs throughout the province. It is caused by a deficiency of iron, one of the important constituents of the blood. Young pigs born during the summer and fall months are able to get a sufficient amount of iron from the soil to meet the necessary requirements. For this reason the condition is not usually noticed during the period mentioned. In the case of pigs born during winter months, or under conditions when they have not access to earth, the condition is of common occurrence. Young pigs born in small quarters, and especially on cement floors, appear to be particularly susceptible.

Symptoms.

Due to the rapid growth of young pigs the need of iron commences when they are about seven to ten days old. If they do not receive the required amount of iron the symptoms should be well defined when the pig is about three or four weeks old. One of the early indications of Anaemia will be that the skin, instead of being pinkish in color, becomes pasty white. The hair, normally, should be bright, smooth and shiny, but loses its lustre and silky appearance. Anaemic pigs are susceptible to digestive, respiratory troubles, scours and Pneumonia. Thumps are frequently present and often appear in the early stages of the disease.

Prevention.

Anaemia cannot be prevented by feeding iron compounds to the nursing sow in the hope of raising the iron content of the milk, so that prevention lies in administering iron, in some form, direct to the young pigs. This may be accomplished by one of the following methods:

1. Store a quantity of clean sods or earth in the fall before freeze-up and place a piece of sod about one foot

square, or a shovelful of the soil in a corner of the pen or an adjacent runway where the small pigs can have access to it. This plan can be improved by sprinkling the sods with a strong solution of iron sulphate, or by dusting about one teaspoonful of iron sulphate on the sod or earth before placing in the pen.

2. Dissolve 3 ounces of iron sulphate and one-half ounce of copper sulphate in one gallon of water and give each pig one teaspoonful of the solution every other day from the age of 7 days to 3 weeks.

3. Treat the pigs individually with reduced iron (Ferric Hydroxide) at 7 and 14 days of age. The small pigs should be taken away from the sow, picked up individually and the quantity of reduced iron (a greyish black powder), which can be carried loosely on a ten-cent piece (about 15 grains), placed on the back of the tongue when they are the ages mentioned. For greater safety repeat the treatment at 21 days. If some high-grade cod liver oil is available, place one-half teaspoonful on the tongue before giving the reduced iron. This will avoid any loss of the powder and will serve as a good "tonic" for pigs of this age.

The use of "Ferexate Tablets" as a preventive against anaemia has been found effective and is popular with many swine men. It is a combination of exsiccated ferrous sulphate and copper sulphate. It is especially prepared for iron deficiency in young pigs. The dose is one tablet, given by the mouth, on the second, eighth and fifteenth days after birth. This is a cheap, effective and convenient method of treating young pigs for anaemia.

"Thumps"

(Spasm of the Diaphragm.)

Thumps is a condition caused by violent contractions of the diaphragm, and the result of stimulation of a certain nerve in the body. It is most frequently the result of disturbances of the digestive tract; over-loading of the stomach, improper feed, and inflammation of that organ, are all conducive to thumps. It occasionally appears as well in diseases of the respiratory organ.

Cause.

Thumps are usually the result of lack of exercise, as well as improper feeding particularly in young pigs. It may also occur as indication of inflammation of the stomach and intestines, or the result of a heavy infection of parasites. A large percentage of the animals affected with this condition are, upon examination, found to have parasites either established in the intestinal tract or migrating through the lungs.

It may also occur in pneumonia or other respiratory disturbances.

Symptoms.

The condition is characterized by a sudden jerking of the flanks, accompanied by a sound that is quite distinct. The contractions of the diaphragm sometimes occur in rapid succession and then will be followed by a period, apparently, normal. The animal will usually be listless, and there are indications as well of indigestion.

Treatment.

If the owner is satisfied that the young animal is not infected with parasites, it should be treated with some laxative, such as Linseed Oil or Glauber's Salts. It should be given plenty of exercise with good sleeping quarters and much sunshine. The diet, for a few days at least, should be of a laxative nature. If the condition occurs in young pigs only a few days old, it is advisable to change the feed of the sow and administer to her a dose of raw Linseed Oil, varying in quantity from 4 to 10 ounces, depending upon the size and weight of the animal. Should parasites be the cause, however, the animal may be treated with oil of chenopodium, one (1) fluid dram to a one hundred pound animal; this to be followed by one or two ounces of Castor Oil.

Abnormal Appetite of Swine

The cause of this condition may be a vice or mania of some kind, and why a perversion of appetite occurs in this class of animal is difficult to explain. In some instances it is shown by the animal eating foreign material, such as decayed flesh, rotten wood, earth, and in some cases by the sows eating their young. In the last mentioned instance, this depravity of appetite is caused by improper feed during the last few weeks of the gestation period. For this reason it is advisable to gradually change the feed of the sow some two or three weeks prior to farrowing time, eliminating as far as possible the fat forming elements. Many swine men claim that the addition of small quantities of tankage to the feed for some ten days or two weeks prior to farrowing will prevent this trouble. Allowing the pigs access to proper mineral mixtures will do a great deal in the prevention of depraved appetite.

Hemorrhagic Septicemia (Swine Plague)

This disease is common in Alberta and is responsible, at times, for quite extensive losses. Although young pigs are the most likely to contract the trouble, older swine are not entirely immune. Swine Plague is not always fatal,

but affected animals often become stunted and unthrifty. Swine kept under insanitary conditions, and especially where the sleeping pens are damp and poorly ventilated, or where they have access to dusty, mouldy straw, are likely to contract the trouble.

Symptoms.

Two forms, acute and chronic, are found in this province. In case of the first mentioned form the symptoms develop rapidly, and often death takes place within twenty-four hours. Should the case become chronic the animal is unthrifty, the hair is rough and a pronounced cough is noticed. The symptoms of Swine Plague may be briefly summarized as follows: Increase in temperature; loss of appetite; discharge from the nostrils; general weakness; constipation and diarrhoea. In some cases, especially in the acute form, there is a marked discoloration of the skin, especially in the region of the throat, and the lower part of the abdomen. If a post mortem examination is made, areas of the lung will be found congested, dark red in color and solidified. Not infrequently the lungs may be found attached to the walls of the chest cavity.

Prevention and Treatment.

The sanitary conditions under which swine are kept should be checked carefully. Dampness and poorly ventilated pens are often contributing factors in outbreaks of Swine Plague. The isolation of animals showing symptoms of the disease should be attended to at once. Proper feeding is also important and easily digested food should be fed. The use of biological products may be helpful in some outbreaks. Under certain conditions in this acute form—when symptoms are first noticed, the use of Anti-Hemorrhagic Septicemia Serum in doses of 20 to 40 c.c.'s for a hundred pound pig may prove beneficial. It may also be used as a quick immunizing agent for the protection of exposed swine, but its effect will not be lasting. Swine not affected may be protected through the subcutaneous injection of Bacterins of the Porcine type. We believe the injections of Mixed Bacterins (porcine) to young pigs about ten days old have a place in giving protection against Swine Plague. A second and larger dose may be given at two or three months of age, and it appears to give a greatly added resistance. Medicinal treatments have not proved of any great benefit in the treatment of this disease, but proper feeding, care and management are of the greatest importance when an outbreak of the disease has occured.

Parasites in Swine

There are several intestinal parasites of swine, but the one most commonly found in Alberta is the "Ascaris" or Round Worm. Parasites are more prevalent in young swine, but on account of the habits of this class of animal, and in some instances where swine are fed on the ground, it is not uncommon to find older hogs infested. This parasite is from 6 to 10 inches in length, pinkish white in color and tapers to a point at both ends. It is usually found in the small intestines. On account of the peculiar life history of this parasite a variety of symptoms may occur; the eggs are passed off with the droppings of infested pigs, where they undergo a hatching process. When the eggs are taken into the digestive tract the larvae are liberated and, gaining access to the blood vessels, are carried to the liver. From the liver they reach the lung, where they undergo certain changes and eventually are coughed up and swallowed, passing into the small intestine, where they develop into the adult worm. The invasion of this parasite through the various organs of the infested pig may result in a variety of symptoms, and unless a careful post mortem is held it is difficult to make a positive diagnosis.

Symptoms.

Should the infestation be heavy, unthriftinesss, variation of appetite and vomiting may occur. The pig may show an enlarged abdomen and a rough, dirty, scaly skin. A short husky cough indicates lung infestation, and thumps are frequently an indication of Ascaris. Occasionally infested swine may show nervous symptoms—these are usually indicated by convulsions, running in circles and sudden collapse; when they struggle violently for a few minutes, then rise to the feet and, apparently, recover. Any or all of the symptoms mentioned may be found in swine infested with the round worm.

Prevention.

Prevention should be the first consideration in controlling Swine Parasites. Clean hog houses, pens and yards will greatly diminish the extent of the infestation. The floors of all buildings housing swine should be carefully disinfected at regular intervals. The eggs of the round worm are most resistant to ordinary disinfectants, and for this reason special attention must be given to the proper method of destroying worm eggs. The pens should first be cleaned thoroughly by removing all dirt and filth; this includes the walls and feeding troughs. When this has been completed, all parts of the pen should be thoroughly washed with lye

in a solution composed of one (1) pound of lye to thirty (30) gallons of hot water. Old hog yards and pastures are probably the source of infestation, and for this reason swine should be changed to new pastures every two years. Runways and chutes should also be thoroughly disinfected.

Treatment.

The treatment of individual hogs is a difficult task, but may be done in the case of young pigs if capsules are used. Nema Capsules are safe and reliable and may be used to good advantage in treating swine weighing up to fifty pounds. They are given by the mouth by means of tongs which may be obtained for the purpose. Full directions as to the dose and preparation of the animal prior to treatment accompanies each package.

Oil of Chenopodium is a safe and reliable treatment for intestinal parasites, and many swine men prefer this drug to any other. The dose is from thirty to sixty drops, depending upon the size of the pigs. This drug should be mixed with one or two ounces of Castor Oil and given in milk or sloppy feed. All swine treated with Oil of Chenopodium should be starved for 24 hours before giving the parasiticide.

The use of Phenothiazine as a treatment for intestinal parasites is popular with many. Its chief advantage is that it can be mixed with the feed and no starving of the animal is necessary. The dose should be repeated in two weeks to obtain the best results. Should Phenothiazine be given to swine they should not be exposed to bright sunlight for 48 hours after treatment. The drug should not be given to pregnant sows, as it might cause abortion. There are more effective remedies than Phenothiazine in removing immature parasites from the intestinal tract of young pigs, and this should be taken into consideration when treating young pigs. The dose recommended for Phenothiazine is as follows:

Pigs 40 to 60 lbs.....3 drachms, or 3 level teaspoonfuls.
Pigs 60 to 100 lbs.....4 to 6 drachms, or 1 to 1½ tablespoonfuls.
Pigs 100 to 150 lbs.....6 to 8 drachms, or 1½ to 2 tablespoonfuls.
Pigs 150 to 200 lbs.....1 to 1½ ounces or 2 to 2½ tablespoonfuls.
Pigs 200 lbs. and up.....1½ to 2 ounces or 3 to 4 tablespoonfuls

Note: All measurements are level spoonfuls.

Rhinitis (Bull Nose)

Contrary to the general impression Bull Nose has existed in the province for a considerable time. Losses from the disease are becoming more prevalent due to increased hog production. The fact that swine are born in the same pens and raised on the same ground for consecutive years tends to increase the number of animals affected. It is believed infection takes place from contaminated soil, the infected

feces of older pigs, or from direct contact with pigs suffering with the acute stages of the disease. The continuous use of insanitary premises, combined with poorly ventilated hog houses and possibly susceptibility to infection — the result of in-breeding — all may have a tendency to increase the incidence of the disease.

The cause of rhinitis is the organism "necrobaccillosis", and it may be found in the intestinal tract of, apparently, healthy swine without producing any ill effects.

The soil of hog lots that have been used for a number of years, and manure from hog pens where infested swine have been kept, are believed to be the most common means of spreading infection. Swine under the age of three months appear to be the most susceptible. It is often noticed that when the disease first appears on a farm a limited number of swine become affected, but there is a rapid increase in the disease with each succeeding year, until the percentage of swine showing evidence of the disease is quite high.

Symptoms.

Sneezing may be one of the first indications of the trouble. This is followed by a watery discharge from the nose which later becomes thicker in consistency. In some instances bleeding at the nose may be noticed. There will also be inflamed areas on the mucous membrane lining the nasal chambers. As the disease progresses a bulging or deformity of the bones in the region of the nose and face may be noticed, and this will be accompanied by wheezing, sniffling and sneezing. Should the disease occur in nursing pigs they soon become thin, weak and emaciated. In pigs over weaning age growth becomes retarded, they become stunted and fail to make profitable gains.

Treatment.

So far no specific treatment is being advocated. Sprays of antiseptic solutions and inhalation of such drugs as Oil of Eucalyptus or Creosote might be of value, but when deformity of the bones takes place nothing in the way of medicinal treatment will be helpful. We believe that cleanliness is an important factor in preventing "Bull Nose". Young pigs should be kept away from old pastures and hog lots that have been used continuously for two or three years, as these are likely to be contaminated. The hog pens should be cleaned daily and disinfected at regular intervals with one of the reliable coal tar disinfectants. Care should be taken in bringing new swine on to clean premises, and when purchasing breeding stock they should be obtained from herds where the disease does not exist. We have always

advocated the isolation of newly purchased swine for at least two weeks before allowing them to come in contact with other swine on the premises. We believe this to be a good swine practice and will often be the means of preventing the spread of infection.

Dysentery in Young Pigs

Scours in young pigs one to four weeks old is of common occurrence. It may be due to bacterial infection, but in very young pigs the trouble can often be traced to faulty diet of the sow. The diet of brood sows immediately before — as well as after farrowing — is most important, and has been discussed elsewhere in this Bulletin. Should scours be caused by too much milk, or where the milk is too rich and is causing digestive disturbance in the little pigs, the condition can usually be corrected by reducing the amount of feed given the mother. It has been recommended that adding one teaspoonful of formalin to the drinking water and allowing the sow access to this at all times, is helpful in many cases. The little pig suffering with scours may be given from a half to one teaspoonful of castor oil, and also one teaspoonful of lime water several times a day until improvement is noticed. Should the trouble be due to bacterial infection the first thing that should be done is a careful disinfection of the farrowing pen, the administration of castor oil and lime water is advisable, and, in addition, from 10 to 20 grains of sub-nitrate of bismuth is recommended. The administration, hypodermically, of Mixed Bacterin (Porcine Formula No. 1) at 3 day intervals in 2 to 4 c.c. doses, as well as the use of Swine Mixed Infection Serum in 10 c.c. doses, the former to be used as a preventive and the latter in cases where the pig shows evidence of the disease.

Stomatitis
(Sore Mouth)

This is an inflammation of the mucous membrane of the mouth, and is quite common in swine.

Cause.

It may occur in various ways, as injury from frozen foods, stubble or bearded grains, as well as from decomposed feeds, fermented silage, hot feeds, poisonous moulds or bacteria in filthy, stagnant wallows. We have often found that garbage containing washing powders, broken glass, etc., will be the cause.

Symptoms.

The trouble in indicated by a profuse salivation or drooling from the mouth. The membranes are found to be hot

to the touch and the animal shows difficulty in eating, or refuses to eat at all. Not infrequently the mouth gives off an offensive odor. Thirst, as a rule, is greatly increased. In young pigs the condition is shown by infrequent attempts to nurse, followed in a few days by depression, gauntness and quite frequently by diarrhoea.

Treatment.

The condition can easily be prevented by proper care in the feeding of this class of animal. If garbage is fed, injurious materials should be kept out of such feed. Feeds given on clean floors or platforms are not so likely to become contaminated as those fed upon the ground. The animals should be kept away from wallows in the hog lot when the symptoms appear. They should be given access to clean, cold water. The addition of chlorate of potash to the drinking water is beneficial. The amount given is about three tablespoonfuls to a gallon of water. The animal should be placed upon a diet of milk and bran until it shows signs of recovery. Any abrasion of the mucous membranes should be treated with tincture of iodine.

Agalactia
(Lack of Milk in Sows)

This is a condition common in brood sows where there is a sudden cessation of milk secretion and the mammary gland cells fail to produce more. Serious losses in this province have occurred on numerous occasions from this source. Most cases of lack of milk usually occur from three to five days following farrowing and the first sign of the condition noticed in the young pigs is their gauntness and weakness, and their persistent attempts to obtain milk. It is doubtful if there is any relationship between this condition and the character of the feed of the sow, as it has been noted that it occurs under all conditions, regardless of breed and age. The general condition of the sow has, apparently, no influence upon the case. It is generally considered that the cause of the trouble is due to some disturbances of the endocrine glands. On farms where it is common we recommend the administration of maltine, or finely ground barley. This may be soaked from twelve to twenty-four hours and kept at a warm temperature for that period of time. We generally recommend that this be given for a few days prior to farrowing, and continued for at least two weeks thereafter. We feel quite sure that if these instructions are followed many of the cases of this condition can be prevented. The administration of certain gland extracts of the sow increases the milk flow, but should be used only under the direction of a Veterinary Surgeon.

The Feeding of Orphan Pigs

One of the serious consequences of Agalactia in sows is the loss of suckling pigs. If some method of successfully feeding them could be devised, it would not only be profitable, but of very great advantage to the swine breeder, particularly if he is anxious to preserve them for breeding purposes. It is advisable in the feeding of this particular class of animal to provide a food, the composition of which is as closely related to that of the mother's milk as possible. The following is a carefully worked out, modified milk formula that has been fairly successful in meeting the requirements of orphan pigs. It consists of one pound of cow's milk, one pound of lime water, one quarter pound separator cream, one-half pound sugar. These ingredients should be mixed in clean vessels, and the young pigs, from one to ten days old, should be given about one-half a pound, divided into five different quantities, spread over a period of twenty-four hours.

It should be borne in mind that young pigs should not gain in weight for the first ten days, and if one can hold them in a healthy condition for that period of time, the chances of losing them will be greatly diminished. If the pigs reach the age of about ten days, the composition of the milk can be gradually changed by reducing the sugar, cream and lime water, and at the age of three weeks straight cow's milk may be safely fed.

One of the most important factors in feeding orphan pigs is the great care that is necessary in having all utensils cleaned properly. If this is done, little loss may be expected from indigestion or digestive disturbances.

Paralysis of the Hind Quarters in Swine

This disease is quite common among swine, especially when the diet is chiefly grain and when there is a lack of vitamin D in the ration being fed. The action of vitamin D deals particularly with the disposition of lime salts in the body, and the same results occur when animals are not exposed to direct sunlight. Should swine be fed almost entirely on a grain ration and housed in dark quarters, there may be a change in the calcium or lime balance in the body, resulting in interference in locomotion, especially in the hind quarters.

Symptoms.

There may be only slight lameness affecting one or both of the two hind limbs. In some instances, however, the animal may lose the complete use of the hind quarters while the front limbs appear practically normal. Occasionally

the animal may be paralyzed in all four limbs, but this is an exception. The appetite usually remains normal, and with the exception of the posterior paralysis no other symptoms may be apparent. Should the condition exist over a considerable period of time, the joints become enlarged.

Prevention.

The condition can be prevented by providing swine with plenty of sunlight, as well as a properly balanced ration, which includes milk, tankage and alfalfa, in addition to the coarse grains. The feeding of alfalfa to swine has, apparently, greatly reduced the number of cases of posterior paralysis, and it is only occasionally the condition arises when this legume is being fed.

It has been suggested that allowing swine free access to a mixture of ten parts steamed bone meal and one part tankage will prevent the condition, and in addition small doses of cod liver oil each day will be found helpful.

Treatment.

The giving of lime water in either feed or drinking water, to affected animals showing symptoms of the condition is recommended, but it will likely take some time before any improvement will be noticed when given this way. The dose would be one or two ounces once a day, depending upon the size and age of the animal. Lime water can be purchased at any store at a nominal price.

Recently the injections of calcium solutions intra-muscularly, has been found very satisfactory in the treatment of this trouble, and if the services of a Veterinarian are available he should be employed.

Paralysis of the hind quarters of swine should not be confused with hypocalcaemia in sows. The latter condition usually occurs a few days following farrowing.

GESTATION TABLE FOR BROOD SOWS (based on 112-day pregnancy period)

Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due	Date Bred	Date Due
Jan.	Apr.	Feb.	May	Mar.	June	Apr.	July	May	Aug.	June	Sept.	July	Oct.	Aug.	Nov.	Sept.	Dec.	Oct.	Jan.	Nov.	Feb.	Dec.	Mar.
1	23	1	24	1	21	1	22	1	21	1	21	1	21	1	21	1	22	1	21	1	21	1	23
2	24	2	25	2	22	2	23	2	22	2	22	2	22	2	22	2	23	2	22	2	22	2	24
3	25	3	26	3	23	3	24	3	23	3	23	3	23	3	23	3	24	3	23	3	23	3	25
4	26	4	27	4	24	4	25	4	24	4	24	4	24	4	24	4	25	4	24	4	24	4	26
5	27	5	28	5	25	5	26	5	25	5	25	5	25	5	25	5	26	5	25	5	25	5	27
6	28	6	29	6	26	6	27	6	26	6	26	6	26	6	26	6	27	6	26	6	26	6	28
7	29	7	30	7	27	7	28	7	27	7	27	7	27	7	27	7	28	7	27	7	27	7	29
8	30	8	31	8	28	8	29	8	28	8	28	8	28	8	28	8	29	8	28	8	28	8	30
	May		June	9	29	9	30	9	29	9	29	9	29	9	29	9	30	9	29		Mar.	9	31
9	1	9	1	10	30	10	31	10	30	10	30	10	30	10	30	10	31	10	30	9	1		Apr.
10	2	10	2		July		Aug.	11	31		Oct.	11	31		Dec.		Jan.	11	31	10	2	10	1
11	3	11	3	11	1	11	1	..	Sept.	11	1		Nov.	11	1	11	1		Feb.	11	3	11	2
12	4	12	4	12	2	12	2	12	1	12	2	12	1	12	2	12	2	12	1	12	4	12	3
13	5	13	5	13	3	13	3	13	2	13	3	13	2	13	3	13	3	13	2	13	5	13	4
14	6	14	6	14	4	14	4	14	3	14	2	14	3	14	4	14	4	14	3	14	6	14	5
15	7	15	7	15	5	15	5	15	4	15	5	15	4	15	5	15	5	15	4	15	7	15	6
16	8	16	8	16	6	16	6	16	5	16	6	16	5	16	6	16	6	16	5	16	8	16	7
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18	10	18	10	18	8	18	8	18	7	18	8	18	7	18	8	18	8	18	7	18	10	18	9
19	11	19	11	19	9	19	9	19	8	19	9	19	8	19	9	19	9	19	8	19	11	19	10
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24	16	24	16	24	14	24	14	24	13	24	14	24	13	24	14	24	14	24	13	24	16	24	15
25	17	25	17	25	15	25	15	25	14	25	15	25	14	25	15	25	15	25	14	25	17	25	16
26	18	26	18	26	16	26	16	26	15	26	16	26	15	26	16	26	16	26	15	26	18	26	17
27	19	27	19	27	17	27	17	27	16	27	17	27	16	27	17	27	17	27	16	27	19	27	18
28	20	28	20	28	18	28	18	28	17	28	18	28	17	28	18	28	18	28	17	28	20	28	19
29	21	..	..	29	19	29	19	29	18	29	19	29	18	29	19	29	19	29	18	29	21	29	20
30	22	..	..	30	20	30	20	30	19	30	20	30	19	30	20	30	20	30	19	30	22	30	21
31	23	..	..	31	21	..	..	31	20	..	..	31	20	31	21	..	..	31	20	..	..	31	22